DISSERTATION

EMERGENT GROUPS AND DISASTER SUBCULTURE: A UNIVERSITY'S RESPONSE TO THE JULY 28, 1997 FLOOD

Submitted by

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY MICHAEL E. KENNEDY ENTITLED: EMERGENT GROUPS AND DISASTER SUBCULTURE: A UNIVERSITY'S RESPONSE TO THE JULY 28, 1997 FLOOD, BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

EMERGENT GROUPS AND DISASTER SUBCULTURE: A UNIVERSITY'S RESPONSE TO THE JULY 28, 1997 FLOOD

The purpose of this study was to determine what factors aided or hindered Colorado State University's (CSU) attempts to stabilize and restore the campus to a more normal state. Bureaucratic organizations may adapt to community emergencies in one of three ways: 1) with their normal structure, 2) planned modification of their structure, or 3) unplanned modification of their structure. Communities that are frequently impacted by natural disasters often develop planned modification of their normal structure to deal with emergencies. These organizations have developed a disaster subculture.

Sometimes, however, communities and their organizations need to find a new modified structure that adequately prepares them to cope with a natural disaster. They must develop a completely new structure and pattern of operations to address the new demands. A new task and decision-making structure emerges out of the previous formal structure. Decision-making responsibilities are reallocated and new task groups emerge within the organization.

Although the University had a few rudiments of a disaster subculture, it was not sufficiently developed to adequately address the demands placed on it by the flood. It did not have a very realistic perception of the threat from a flood of this magnitude. Nor did it have an organizational memory of previous flooding.

CSU's existing formal structure was totally inadequate to cope with the increased demands. It did not have disaster plans that could be made operational. The University de-bureaucratized. In the void, new relationships and groups emerged within the organization. Lack of adequate coordination of activities and communications were major problems in the recovery stage of this flood.

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For Ronny Turner, my mentor,
A difference that doesn't make a difference isn't a difference.
He made me laugh.

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CHAPTER I

INTRODUCTION

There are a number of hazards with the potential to strike anywhere in the State of Colorado with potentially disastrous results. The Colorado Office of Emergency Management (OEM 2004) has identified nineteen hazards and they are: avalanche, dam safety, drought, earthquake, expansive soils, extreme heat, fires, floods, hail storms, hazardous materials, landslides and rockfalls, lightning, precipitation, subsidence, thunder storms, tornadoes, wind storms, winter weather, and terrorism. Floods are the most common and widespread of all these natural or human made hazards. Around the state there are 267 cities and all 64 counties that have floodprone areas. Flash floods are the most common type of flood. Usually initiated by "sudden, excessive rainfall" that causes a body of water to move rapidly out of its banks, flash floods are usually of short duration, but have the potential to cause serious damages and losses. OEM's homepage offers,

> Fast-moving water is extremely powerful. The result can be deadly to anyone in the water's path. The force of flash flood waters can be extremely dangerous to motorists who unwittingly or unknowingly drive over water-covered roads - only two feet of running water are needed to sweep away a car (2004).

The most devastating flash flood in Colorado history occurred on July 31, 1976 in the Big Thompson Canyon. The Weather Encyclopedia (2004) describes the events of that day.

> A weak but moist easterly flow was forming on the east side of the Rockies. The air rose up the mountain slopes, enhanced by daytime heating which caused cumulus clouds to spring up. As the afternoon wore on,

> benign cumulus clouds developed into cumulonimbus clouds, then into a thunderstorm accompanied by heavy rain.
>
> The winds generally found at mountain crests of 10,000 feet are strong enough to push thunderstorms eastward and out of the area. On this particular afternoon, however, the upper winds were extremely weak, and the storm remained stationary over the mountain. Heavy rain continued to fall.
>
> The slope leading into Big Thompson Canyon is sheer rock, unlike slopes with soil and vegetation which are able to absorb water. As the heavy rain fell, it plummeted straight down the walls of the canyon to the Big Thompson River below.
>
> Eight inches of rain fell in one hour. The water in the river quickly rose over its banks. The weight of the charging water was so strong that it sent huge boulders hurtling with it downstream.
>
> Residents and visitors had no idea that they were in the path of raging flood waters. Within two hours the Big Thompson Canyon Flood created over $30 million of property damage and killed at least 139 people [and five were missing].

The Fort Collins Coloradoan Online (2001) stated,

> On July 31, 1976, a violent rainstorm sent a rampaging wall of water through Big Thompson Canyon, returning it to its primordial state. The massive millennial flood killed 144 residents and visitors at one of Colorado's most popular destinations.

Some said the storm was a once in 300-year storm. In total, ten to fourteen inches of rain fell in four hours, the equivalent of a year's rainfall. The U.S. Army helicopters rescued 850 people from the canyon. At least 418 homes were destroyed and 138 more were damaged. The business sector lost 52 businesses. The total cost of this disaster, in 1976 dollars, was $35.5 million dollars (The Fort Collins Coloradoan Online 2001).

The Big Thompson Flood remains engrained in many people's memories. I was in the Big Thompson Canyon that day and reached the eastern end just before it started to

rain. My next stop was to my home in Rist Canyon about twenty miles north of the Big Thompson Canyon. It was pouring rain. The small creek that was usually just a trickle and ran along the side of the road into this canyon was well over a foot deep, out of its banks, and completely covered the road. After waiting about an hour the flow in the creek subsided. The roadway was covered in many places by river gravel and rocks, some quite large.

Soon after the Big Thompson Flood signs began to appear in the canyons around the state telling people to: "Climb to Safety! In Case of a Flash Flood." I remember the day one of the signs was erected at the mouth of Rist Canyon.

Another devastating flash flood occurred on July 28, 1997 a few miles north of the Big Thompson Canyon. "This storm produced the heaviest rains ever documented to have fallen over an urbanized area in this state in the recorded history of Colorado" (Grigg et. al 1998, p. 124). This "urbanized area" was Fort Collins, a small city of 125,000 people on the eastern edge or Front Range of the Rocky Mountains, and is home to Colorado State University (CSU). At one time or another, both the city and the University have experienced the impact of severe weather events, particularly flooding. As naturally occurring phenomena, floods can be nuisance events such as street flooding or extremely devastating events as seen with the Flood in Big Thompson Canyon.

The flood that hit on July 28, 1997 manifested into a major flooding disaster. In a 24-hour period torrential downpours left more than 14 inches of rainfall just southwest of the campus, and 12+ inches fell to the northwest (see Appendix I) with Fort Collins and CSU directly downstream from each area. The tremendous amount of rain created a flash flood that struck the University head on. Fortunately, the flood occurred during the

summer when most of the 23,000 students were away from campus. No one on campus was killed. The rushing water had struck forty buildings. Professors' offices and classrooms were ruined in several of the buildings, intense damage occurred in the other buildings, and millions of dollars in equipment was destroyed. On the campus grounds the intensity and volume of the floodwaters moved the dirt from the softball field fifty yards to the east. Both the University Library and Bookstore were in a shambles. The destruction was so intense to both buildings that they were in an unusable condition. Four hundred sixty-five thousand volumes in the Library, almost one third of the collection were damaged and deteriorated quickly. The Bookstore's supplies of textbooks for the fall semester were completely destroyed, and the semester was scheduled to begin just three weeks later.

According to Bogard (1989), occurrences of natural disasters are increasing every year. Although the number of people around the world multiply, the traditional usable land mass remains the same, thus forcing people to move into nontraditional areas that are more prone to severe weather events. Population shifts and concentrations expose people, in greater numbers, to natural and human-made risks. Because, there is less and less prime land suitable for development, the developers are forced to use this less desirable nontraditional land, such as floodplains, earthquake zones, tornado zones, and areas susceptible to rockslides and the like. Human interaction within this marginal land increases the risk of people becoming victims of a natural disaster. In addition, people tend to concentrate near newly built large industrial projects such as Union Carbide's Bhopal Chemical Plant in India. The people move to the jobs, the jobs do not move to the people. Other analysts' note,

> [The] global death toll of natural disaster rises at least as fast as the increase of population and material wealth, and probably faster. . . . Each year the population equivalent of a city of about 250,000 dies in disaster, and the material loss exceeds per capita development gains of many nations (Burton, Kates, and White 1978, p. 4).

Populations have continued to grow, developers have continued to develop, and more people are killed by natural and human made disasters.

While the basic meteorological, hydrological, and geological forces of nature have existed since the beginning of time, such forces become disasters only to the extent that they directly impact people or organizations. The human communities that are at-risk increase within the natural environment as the population grows and development continues. Contact between people and severe weather events continue to increase as more and more people accept the risk and reside in locations most vulnerable to natural disasters. Just as people who move into wood-frame housing without fire alarms or adequate escape routes are more likely to be injured or die from fires, so are people who live in houses built on flood plains. As more and more people live closer together in disaster-prone areas, the likelihood they will suffer physical harm and disruption also increases.

As the population of the United States continues to grow in number and density in certain areas, i.e. along both coasts, by the Great Lakes, and other water areas such as rivers, canals, and lakes, more land is needed to provide for this population. Housing and other structures, for instance, strip malls are built and are necessary to serve the people building and living in the new developments. The growth is urban sprawl occurring both around the large cities and in smaller cities where the people moved hoping to avoid the big city life. A lot of people had the

same idea and soon the growth of the smaller cities produced another large city. People have to live somewhere, and they often move to where there are jobs and opportunities. This migration adds to the population density of an area.

When the density of the population overtakes the land not subject to flooding, building takes place in less desirable areas such as watersheds and flood plains. This development increases the risk of a conflict with nature. The density of the population is a key factor for a disaster to take place. Disasters are not limited to watersheds and flood plains however. In 1956, an earthquake struck Shanni, China killing 830,000 people. More recently (1988), 55,000 died in Armenia and in 1990, more than 40,000 perished in northwest Iran. These deaths were the result of natural disasters in densely populated areas. As the cities spread and the populations grow, the need for expansion becomes evident. The marginal land such as flood plains, areas subject to earthquakes, or hurricanes become available for development. It is important to recognize that these areas that are subject to potential disasters may be the only places available to meet the needs of this expanding population regardless of the possibility of disaster.

Not all earthquake zones or floodplains, or hurricane prone areas are considered less desirable lands. California's earthquake faults are very desirable to many millions of people. Florida is extremely vulnerable to hurricanes, as are the coastal areas from Texas to the Northeastern seaboard and a lot of people live there. Much of the United States is densely populated and is situated in possible disaster prone or hazardous areas.

During the 19th and 20th centuries, the United States relied heavily on rivers for travel and agriculture. Cities developed along these rivers. With the fertile lands in the flood plain along these rivers, agriculture became a big business. People attempted to

change nature in ways they wanted nature to behave such as building dikes along some rivers to keep the water from flooding where cities were built and crops were grown. History has shown us that the rivers do what they want to do regardless of any attempts to control them.

The rapid development taking place in these same disaster-prone areas are liable to suffer the same effects as has any prior development. As a result, the cost in dollars increases because of the number of people injured or killed, the damage the flood inflicts on buildings and structures, cropland destruction, insurance increases, larger bureaucracies, and ever-present inflation. On the other hand, according to Persons, in 1998, 20,000 acres of trees in the Routt National Forest were blown down and tossed around like toothpicks (1998). Because no one lived there, no one was harmed and a natural disaster never took place. As Wenger explains,

> Floods inundate unpopulated flood plains; earthquakes occur on the floor of the ocean; blizzards blanket barren tundra. . . . In every case such a classification [disaster agents] is meaningless with respect to disaster and crisis behavior. The essence of a disaster event, therefore, lies in the social, not physical consequences (Wenger 1978, p. 26).

It is the conflict between nature and society that sets the stage for "natural" disasters.

Severe flooding is normal, natural, and goes unnoticed if it occurs in sparsely populated areas. However, when the interaction takes place with "human communities at-risk" then the event has the potential of becoming a disaster (Wright, Rossi, Wright and Weber-Burdin 1979 p. 35). On this point, many experts agree:

> A 'natural disaster' is both a natural and a social phenomenon . . . It is the interplay of an unusual natural event with the [hu] man-made occupied environment which produces a "natural hazard' and

> perhaps a natural disaster (Friesema, Caporaso, Goldstein, Lineberry and McCleary 1979, p. 143).

In 1989 the National Research Council calculated that during the past 20 or so years, natural disasters have claimed almost three million lives and have injured, displaced, and adversely affected more than 820 million people worldwide with direct economic losses of between 25 to 100 billion dollars. Environmental, political, and social losses have to be added to these losses. It is a combination of natural, social, economic, and political values that cause hazards (Mileti, Hutton and Sorensen 1981, p. 13; Brehmer 1987).

Such events are the consequence of a wide array of natural hazards including drought, wildfire, windstorms, tornadoes, hurricanes, volcanoes, flashfloods, coastal erosion, hail, avalanche, lightning, urban snow, and earthquakes (White and Haas 1975, p. 68). Annually, in the United States natural hazard events have occurred dozens of times (Fitzpatrick 1992).

Three identifiable stages supply the framework of a disaster: the pre-impact stage (warning and evacuation), the emergency stage (during and shortly after the actual weather event), and the recovery stage (the rebuilding of what once had been).

Many scholars have studied how organizations such as local governments, companies, universities, and communities plan for and cope with the demands placed on them by natural disasters. Disaster research has focused heavily on the warning and communications phase prior to impact where the organizational, given enough time, may respond to the warning and take action to engage the coming disaster. Other researchers have studied the evacuation phase. That may or may not provide enough time to move

people out of the path of the coming disaster[1]. Without enough time, warnings and evacuations are impossible. Likewise, a considerable amount of research focused on the steps organizations taken during the emergency stage immediately after impact. Tasks include, the care of the dead and injured, search and rescue, and also deal the secondary impacts caused by disasters including, searching for missing people, fighting storm-caused fires, and the effects of unstable structures[2]. Other researchers have considered the long-term psychological aspects linked to the disaster[3]. The current effort focuses primarily on the post-emergency, recovery stage. This stage focuses on the organizations' attempts to return the community to a pre-disaster state. Community efforts immediately after the emergency stage may last weeks, months, or even years before the restoration is complete.

The purpose of this study was to determine what factors aided or hindered Colorado State University's attempts in the attempts to stabilize and restore the campus to a more normal state. We know that bureaucracies function quite well in non-emergency situations, but what happens to them when they are faced with

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[1] On the warning and evacuation stages see these examples: Bauman 1983; Clark and Short 1993; Drabek 1969, 1986a, 1986b; Drabek and Boggs 1968; Dynes 1983, 1994; Dynes and Wenger 1971, et al. 1979; Grigg et. al 1998; Haas and Mileti 1976, Haas et. al 1977; Mileti 1975, 1980, 1997; Mileti et. al 1975, 1981, 1985, 1990; Mileti and Sorenson 1990; Mileti and O'Brien 1992, 1993, 1997; Moore et. al 1963; Perry 1987; Perry et. al 1981, 1982; Quarantelli 1954, 1973, 1978, 1984; Quarantelli and Dynes 1977; Schmeidl and Jenkins 1998; Slovic 1987, 1992, 1999, Slovic et. al 1997, Slovic and Weber 2002; Stallings 1990, 1996; Turner 1983; Turner et. al 1981, 1986. Wallace et. al 1984, Worth and McLuckie 1977.

[2] Insights on the Emergency Stage see: Bellrose and Pilisuk 1991; Brouillette and Quarantelli 1971; Carter 1991; Drabek 1986a & b; Dynes 1970; Fischbach 1997; Fischer 1998; Grigg et. al 1998; Harvey et. al 1995; Hopkins 1997; Kreps 1985; Kreps and Bosworth 1993; Levy 1997a; Livermore and Wilson 1981; Marks et. al 2003; Mileti et al 1975; Mileti and O'Brien 1992; Quarantelli and Dynes 1977; Trissel 1997; Turner et. al 1986; Webb 2003.

[3] On the long-term psychological or economic aspects see these examples: Benthall 1991, 1992, 1997; Blaker 1996; Drabek 1986; Friesema et. al 1979; Grigg et. al 1998; Miller et al 1981; Oliver-Smith 1977, 1996; Oltjenbruns 1998.

new demands? Did the University effectively and efficiently address the demands placed on it during the recovery stage?

Bureaucratic organizations may adapt to community emergencies in one of three ways: 1) with their normal structure, 2) planned modification of their structure, or 3) unplanned modification of their structure (Brouillette 1970, pp. 374-377). Communities that are frequently impacted by natural disasters often develop planned modification of their normal structure to deal with emergencies. They have disaster plans in place prior to the emergency. These organizations have developed a disaster subculture. A good example of this is the U.S. Forest Service. During normal (non-fire) times, it functions as a highly structured bureaucracy. When a forest fire occurs, the Forest Service springs into action with its modified decision-making structure. The fire boss, not the head of the Forest Service, is the top decision maker. The formal relationships that existed prior to the fire are set aside, being replaced with new relationships. This modified structure is carefully laid out in the Forest Services standard operating procedures.

Disaster subcultures usually have two qualities that help them address the heightened demands of a natural disaster. First, they have a realistic perception of the nature and extent of the threat posed by the disaster. This is referred to as risk perception in the literature (Mileti, Drabek, and Haas 1975). Second, organizations in a disaster subculture not only have experienced disasters periodically in the past, but also they have a working memory of them. This is referred to as organizational memory (IEEE 2003, p. 1066). To the extent that

organizations have adequate risk perception and organizational memory, they should be better prepared to deal with the demands place on them by a natural disaster.

Sometimes, however, communities and their organizations find that neither their normal structure nor their planned modified structure adequately prepares them to cope with a natural disaster. They must develop a completely new structure and pattern of operations to address the new demands. The organization may not have had a disaster plan, or if it did, the plan was inadequate to deal with the emergency. In this case, the organization must de-bureaucratize. A new task and decision-making structure emerges out of the previous formal structure. Decision-making responsibilities are reallocated and new task groups emerge within the organization. Did a de-bureaucratization take place at the University in an attempt to cope with the new and increased demands it faced? How did CSU respond to the flash flood during the recovery period? Did it have a disaster subculture with a realistic risk perception and organizational memory? Was it able to address the problems created by the flood with its old formal bureaucratic structure or did a new structure emerge? The present study attempts to answer these questions.

CHAPTER II

LITERATURE REVIEW

Disaster Research

Georg Simmel in 1904 may have been the first sociologist to write about disasters. His work demonstrated how conflict could lead to cohesiveness where the people joined to resolve the conflict (Stein 1976, p. 144). His work began the development of collective behavior and emergent groups.

The pioneering study in disaster research can be credited to Samuel Henry Prince's article "Catastrophe and Social Change" written in 1920 (Moore 1956, p. 734). Disaster research was a fledgling field of study with little research being undertaken and written about. That situation began to change as interest in the field started to show development during the 1950's. In 1951, Irving L. Janis wrote,

> As yet, little advance has been made in the direction of developing any kind of theoretical framework that systematically covers the effects that disasters are known to have on individuals, organizations, and communities (Janis 1951, p. 13).

In 1956, Harry Estill Moore attempted to develop a theory of disaster that was more sociologically inclusive in the way the victims and the community [organization] interacted in the aftermath of a large disaster. He touched on the formation of emergent groups and his work pointed the way for the researchers that followed and were interested in disaster theory.

> Starting [five] decades ago "there was not enough theoretical material or research work on response to social crisis and disasters to have warranted writing more than a footnote attesting to that fact." [Four] decades ago "a paragraph could have summarizes all

> the relevant work and activity." [Three] decades ago, "several pages might have sufficed to summarize totally the burgeoning activities in the area." By the mid 1970's the exponential growth had reached such a stage as to require or "force us to be highly selective" in the choice of topics relating to disasters (Quarantelli and Dynes 1977, p. 23).

Today, grand theories like those of Talcott Parsons have given sway to specialization. The disaster field has taken a narrow approach including topics such as communications, warnings, evacuations, emergency response, and disaster aftermath. Sociological theories based on these narrow topics are the dominant choices of disaster researchers as seen in Chapter I. In this case we will focus on emergent groups and disaster subcultures during the recovery stage of a disaster.

This chapter draws from the attributes of a disaster and examines four in detail and these serve as the basis of this study. The four were drawn from the six principle constructs that make up and define a disaster. Researchers have studied a variety of factors related to natural disasters[4]:

1. The Hazard, or catalyst that engages the disaster or puts the event into motion.

2. The Vulnerability the organization takes upon itself, i.e. the degree to which the organization places itself in harm's way. Alternately, to what extent the organization is willing to gamble that it will not encounter a disaster.

3. Emergent Groups based within the confines of the disaster and the role they play in disaster recovery.

[4]This list is meant as illustrative and is not exhaustive or inclusive. Aguirre 1994; Bardo 1978; Bogard 1989; DHA 1992; Dacy and Kunreuther 1969; Drabek 1986a &b; Dynes 1970, 1987; Fischhoff et. al 1981, 1984; Fitzpatrick 1992; Fogleman and Parenton 1959; Fritz 1961; Harvey et. al 1995; Kreps 1984, 1985; Mileti 1980, 1997; Moore 1963, 1964; Oliver-Smith 2002; Prince 1920; Quarantelli 1978, 1996; Rohrmann 1991, 1994; Slovic et. al 1980, 1991, 1996; Thompson 1990; Weber 1999, 2001, 2002; Wenger 1985; White and Haas. 1975.

4. Disaster Subcultures representing those that have experienced disasters, their beliefs, activities, behavior and values. All of these elements are basic requirements of a disaster subculture.

5. The Perception of Risk, which allows the organization to determine the amount of risk associated with the hazard they are willing to endure and how they develop a perception of that risk.

6. Organizational Memory presents an experiential aspect of the disaster. Without an Organizational Memory, the organization will experience all the aspects of the disaster including reproducing past errors.

Four of the six factors appeared to be relevant in understanding of how communities and organizations cope with natural disasters during the recovery stage – emergent groups, disaster subcultures, perception of risk, and organizational memory. As we will see, the latter two concepts are necessary to aid our understanding of disaster subcultures.

The attributes are abstractions and do not exist in the common property of the organization until the abstractions come into being. This takes two steps: first, the attribute must be identified and second, the attribute must be conceptualized or named. As Blumer puts it,

> That is to say, the very act of abstraction is an act of conception; if the conception is to be held on to it must be given a name, a sign, or an identifying mark. By identifying such an isolated content, two developments of paramount importance for science are possible:
> (1) This content may become the object of separate investigation and reflection,
> (2) It may enter into the experience of others and so become common property (1969, p. 158).

Common property seen from this rationale is an organization's memory of prior interactions with severe weather and therefore identified. The organization experiences the object and once experienced the object is studied and reflected upon in search of a

definition that enters the memory. For example, a severe weather event occurred and the members of a community experienced it. After the experience the event was reflected upon, (i.e. what happened), what went right or wrong, and what can we add to prepare for more events? The weather event is then given a name that is understood by the community to represent their experience and reflection (in this instance a natural disaster). In other words, it enters the common property as a memory. Drawing from that memory the definition can be useful in future events that are similar in nature. Memories can enter the standard operating procedures of an organization especially if they will prevent a repeat of prior errors.

Naming the phenomenon acknowledges its existence and also recognizes the associated risk the organization must consider. Unfortunately, not all risks are known, there are risks that have gone undetected and have substantial potential for a disaster (i.e. earthquake faults). Development on a flood plain is the acceptance of a known flood risk. Colorado State University is built on a flood plain and lacked the knowledge or lacked the memory of severe flooding. The lack of knowledge left the university unprepared for a flooding disaster.

Emergent Groups

At this point, we should define and project the nature, structure, and functions involving the emergence of groups directly following the emergency stage in a flood disaster process. Assuming that "a disaster is primarily a social phenomenon and is thus identifiable in social terms" (Quarantelli and Dynes 1977, p. 24), the emergent group is socially constructed and developed based on some measure of a similarity of roles people assume within the recovery effort. Emergent groups play an important role in all stages

of a disaster including the recovery stage. These groups usually emerge in the location the members of the group are most familiar with (in the buildings where they worked for example), thus providing a valuable resource as the members have intimate knowledge about their "home" territory. Some questions of the group's hierarchical structure, the nature of that structure, and the social impacts based on the structure are offered. What happens to the organization and its structure? How do similar roles develop into a group? These groups are examined and the question is asked as to whether or not the emergent groups followed standard operating procedures or other formalized procedures and were they effective.

Complex organizations have special or specific goals, specialization of tasks with specialized workers, contracted workers, detailed written rules and regulations, official enforcers of those rules and regulations, record keeping, a role hierarchy, and impersonal orientations. These components offer a nice tight package of predictability and when something that can be predicted it can be controlled. Weber (1922/1972) would describe such an organization as a bureaucracy. When the structure of the bureaucracy is inflexible, the bureaucracy makes the world appear permanent. The complex organization maintains the bureaucratic permanency in normal times and produces a status quo with little flexibility. Perrow (1984) describes complex organizations as highly complex and tightly coupled systems, where all of the parts are tied bureaucratically together for the purpose of maintaining the status quo. As systems increases the size and scope of their missions, the interaction of the parts increases and becomes more multifarious, and the whole becomes "highly complex." All the parts become closely connected and bonded in such a way that there cannot be any separation

of the parts making them "tightly coupled." Small, unexpected situations occur, and the highly complex, tightly coupled organization can handle the small strains by having what Merton described as a "defensive informal organization which tends to arise whenever there is a apparent threat to the integrity of the group" (1957, p. 201). This definition pertains only to the small stresses covered by a written procedure. "But what happens to a highly bureaucratic organization when a sudden and great number of demands are placed upon it?" (Brouillette and Quarantelli 1971, p. 40). To what extent can it adapt to these new demands? The lack of flexibility generates stresses that were unknown until challenged in some manner or by some force or phenomenon. This testing may generate knowledge in a way that the organization did not remember or had never encountered, thus was unable to predict the effects on the bureaucracy, depending upon the extent of the changes, create situations that can stress the social fabric to the breaking point or shake the foundations of the bureaucracy. The failure of the highly complex and tightly coupled organization in handling the stresses produces the potential to severely damage the organization. In some cases the damage is so severe the organization ceases to function. Disasters tender the kind of stressors needed to challenge the organization's bureaucracy in such a manner. Something needs to happen for a response to take place and return the organization to a state of equilibrium.

When an organization's existing bureaucratic structure is unable to cope with sudden and increased demands placed on it,

> . . . a `"de-bureaucratization process"' (Eisenstadt 1959, Pp. 302-320) occurs in which some new structures and functions emerge . . . [because the] normal structure lacked sufficient flexibility to deal effectively with the demands it faced, it de-bureaucratized during the emergency period . . . Organization officials themselves

> realized the shift from its normal state . . . . Although the administrative machinery still existed, it was often modified . . . . The hierarchical character of the department organization was changed (Brouillette and Quarantelli 1971, p. 40).

A disaster is an event that develops into a process. "Disasters occur at the intersection of nature and culture . . ." (Oliver-Smith 2002, p. 24), and after the rains stop and the flooding begins we have the ending of the event and the consequences that develop into a cultural and organizational process. It is the process of the disaster providing the stress upon the people, and the organization creating the need for a different administration within the organization that must be capable of flexibility and rapid change as needs are discovered and constructed. As Eisenstadt (1959) implied, the administration is de-bureaucratized and must assume a newly constructed configuration to survive. Wallace (1956) claims that the status quo disappears entirely being replaced by new directions and goals brought about through the process of the disaster. The process links the issues of disaster, cultural crisis, and response. Erickson (1994) called the trauma of such events and processes "a new species of trouble."

According to Oliver-Smith (1996), in times of a crisis, particularly in disasters, a portion of the process is the spontaneous creation or appearance of "emergent" roles for the victims and the participants of the crisis. People with similar roles come together to form an informal group lacking a hierarchy in any formal sense. These are phenomena that did not exist before the disaster, and which often cease to exist once the disaster is over. According to Dynes,

> [In] emergency responses new organizations spontaneously emerge, existing ones undertake non-routine activities (extending responses), those whose involvement is expected (established

> and expandry responses) often have to make substantial changes in everyday routines, and many organizations in the impacted areas stop operating altogether (Dynes 1987, p. 72).

Dynes goes on to define emergent groups as organizations that are newly formed entities that were not a part of the pre-disaster community setting. They are typically informal and relatively undifferentiated structures consisting mainly of residents of the stricken area, at least initially. Often the persons who participate in emergent groups have little or no experience performing disaster related tasks; their relationship and roles are untried and new (1987, Pp. 72-75). He concludes,

> A new definition of the situation must be constructed in which potential responders believe that victims are overwhelmed and require collective response . . . changes in normative patterns that arise out of disruptions in every-day life routines. Large numbers of altruistic individuals emerge (Dynes 1994, p. 142)

People having experienced a common disaster tend to migrate to and interact with others of the same mindset, thus constructing a behavior from the collective experience. "Disasters are occasions where there is extensive elementary collective behavior in that much of what occurs is new and different from everyday behavior" (Quarantelli 1996, p. 47). The collective behavior is in relation to a specific need or goal. Different groups possess the ability to have different forms of collective behaviors and are goal oriented. These are the emergent groups responding to their need and problems within the sphere of what they make out as their responsibility. They respond to the disaster-caused definition of the situation. Aguirre adds: "Whatever the definition of collective behavior, all conceptualizations point out that the collective behavior involves new or emergent phenomena including groups" (1994, Pp. 257-272).

The ideas of standard operating procedures are inadequate to meet the new stresses. There are no written and detailed rules on how to act in a recovery effort, and because the bureaucracy is damaged the normal leaders cannot function in normal ways. Standard operating procedures are dependent upon and defined by the norms of an organization. Once the organization changes away from the norms, the standard operating procedures become moot. With the disaster presenting a first-time event, no procedures exist to include this situation. There is a lack of standards, and any leadership is frozen in its tracks by the lack of normalcy and a customary direction of task completion. The lack of formal instructions to the normal leaders leaves them powerless. They are bureaucratically in tune with the original organization and do not know how to respond to any change in the structure of their roles. Roles change and even role reversal crops up. Brouillette and Quarantelli studied a community's engineering department that was involved in a disaster:

> Several bureau heads were placed either higher or lower in the authority structure than was called for by the table of organization. Others were assigned either modified or completely new responsibilities. For example, the maintenance engineer was elevated above his cohorts and placed in charge of all field operations and general co-ordination (1971, p. 41).

As they point out, the roles of the people change as the needs change. Someone higher up in the organization "promoted" the engineer above those who had previously managed the engineer. After the disaster needs are met, the role reversal returns to the normal hierarchy.

Scholars are interested in collective behavior, according to Killian:

> They have defined it, as being behavior in which people jointly create new norms, new structures or,

> a new social order . . . collective behavior is extra-institutional – not unrelated to previously existing structures and norms, but transcending, opposing, or modifying them and in doing so generating new forms (1994, p. 278).

New forms emerge from standard norms due to situational changes. New uses of old tools allow the collective behavior to emerge in groups and with the interaction of the group's members.

It's the conversation and interaction of the people in the group that define the utility of that group, giving the group a specific identity while creating a mutual tone. This mutual tone may be the root of a group formation or emergence. It may also be a function that requires immediate attention. Unofficial groups will interact with other groups. These interactions are not always beneficial. Minimal "turf wars" may erupt as one group or the other claims ownership of the task or problem. Some group members are unaware of their membership in an emergent group, and it probably would not make much of a difference to them if they did know. The hierarchy of the groups does not provide for immediate leadership, although someone may come forward and assume a temporary leadership role. The task at hand is at first tentively addressed, but when the groups see that they are solving problems or answering questions, they begin to aggressively attack the problems/questions with a concentration of group effort. Without the bureaucracy to lead them, they mimic the actions of the others in the group in accomplishing the task at hand. Socially, the members of the group perform in concert with each other. Some groups also emerge that are anti-social and do not want to be a part of any aspect of the recovery effort. As Quarantelli notes,

> [In our research] we went looking for emergent groups and found some instances [of emergent groups].

> Yet unexpectedly we also found that most of the organizations and groups were not emergent, there were nonetheless considerable emergent phenomena. This suggests the need for a new typology of emergence (Quarantelli 1996, p. 56).

Some groups such as the fire department are not emergent groups *per se*, but they may exhibit emergent behaviors, as might search and rescue groups that might have to break into sporting goods stores to get equipment needed to do their jobs. The police are known to exhibit the same type of "bending the rules." Afterwards, they return to the scene of the "crime" and make amends with the shop owners (Levy 1998).

Oliver-Smith (1996) noted that each of the groups has a different core role or tone setting the parameters of the group's direct interests. These groups are usually altruistic in nature, although some groups seemingly manage to get in the way.

The lack of leadership does not stop organizations from acting. It seem that the commonality, the teamwork, or tone or goals allow the emergent groups to have successes. Eventually, the groups will have served their purpose and are somewhat reabsorbed, often reluctantly, back into their former patterns within the organization. When normal bureaucratic procedures reemerge these group members are reabsorbed regardless of the successes they had managed to provide.

The new organization enabled the movement of personnel to different endeavors. Further in their article Brouillette and Quarantelli also state, "An administrative core which informally developed took charge of disaster-related operations" (1971 p. 41). This would seem necessary after the initial emergent group accomplishments. They run out of things to do and they would lack seeing or have knowledge of the "big picture" finally developed by the re-emerging bureaucracy. Without the knowledge of what to do

next they will either return to their normal duties or continue recovery operations under the new administration. Finally, the bureaucracy, somewhat changed, will take charge. They will know there will be another flood; the only possible question is when?

Disaster Subcultures

Bronislow Malinowski viewed culture as the way of life through the combining of the collective creativity and the society's basic needs (1939). Another view of culture viewed it as a layer between nature and society in relationship with technology and energy (White 1975). Sahlins (1976) and other contemporary anthropologists defined culture using symbolic meanings (Hussain 1997). According to Tylor,

> Culture or civilization, taken in its wide ethnographic sense, [symbolically], is that complex whole which includes knowledge, beliefs, art, morals, law, custom and any other capabilities and habits acquired by a [hu]man as a member of society (Tylor 1871, p. 1)

Within all societies exists a common culture comprised of many lesser cultures. Moreover, within these common cultures subcultures can reside that are more specialized in their experience, knowledge, and attitude than the common culture. Harry Estill Moore was the first to develop the concept of disaster subcultures. He described them as

> . . . those adjustments, actual and potential, social, psychological and physical, which are used by residents of such areas to cope with disasters which have struck or which tradition indicates may strike in the future (1964 p. 195).

The value of a subculture in a social sense allows for a tighter understanding of events particular to a segment and not the whole of a society. In a disaster subculture, one looks within the subculture for understanding the ties to disasters. Their shared symbolic experiences, beliefs, values, norms, and coping mechanisms tie the members of

the subculture together and form bonds different than in the whole culture. "This blueprint for coping includes several cultural elements – norms, values, knowledge, and technology, which take specific disaster subculture forms" (Hannigan and Kueneman 1978, p. 131). The members have gone through an ordeal particular to them, and future disaster experience tightens those bonds and solidifies the subculture.

Usually there is not a clear referent concerning subcultures. Tight boundaries and clear populations are decidedly undefined. The concept of subcultures may have very fuzzy boundaries, they may overlap, or they may reside within other subcultures. Subcultures are not as clearly distinct as being self-evident constructs that are easily recognized and defined. They are not sub-societies, which have the cultural aspects removed. Nevertheless, they do exist. Additionally, Fine and Kleinman found other members of the greater population might share cultural aspects of the subculture (1979). They may share the cultural aspects without being or claiming membership in the subculture.

Within the disaster-research literature, greater experience is associated with the development of what is referred to as a disaster subculture (Wenger 1978, Pp. 23-24; Drabek 1986b, Pp. 365-67: see also Bosworth and Kreps 1986, p. 711). The development of a disaster subculture depends on three common factors: repetitive disaster impacts, a disaster agent which regularly allows a period of forewarning, and the existence of a consequential damage that is salient to various segments of the community (Weller and Wenger 1973). Wenger adds that disaster experience, beliefs, activities, and behavior and values are basic to disaster subcultures (1978). This fact enables the

common relationships within the subcultures by the sharing of the attributes of the subculture.

The specific type of a disaster subculture's boundary becomes more focused by shared understanding, interaction between members, and behaviors within the group in specific situations. The group may be temporary as long as there is a need for it (Becker, Geer, Hughes, and, Strauss. 1961; Spector 1973). Moreover, in some cases, there are subcultures within subcultures. For example, the medical field can act as a subculture of a society, and within the medical subculture there may be other subcultures consisting of medical students, nurses, or pharmacists, *ad nauseum*. The need here is to understand these are not sub-societies as all share some common attributes and have face-to-face interactions within the same constructed subculture (Becker, Geer, Hughes, and Strauss 1961).

According to Hussain, the members of a society first acquire or construct a culture; next, it is a matter of learning and sharing this culture. Taking the acquisition, sharing and learning into consideration, the subculture can be viewed in a relationship as an adaptation to the situation (1997).

During disasters, the members of the affected society acquire/construct a new and more specific subculture where they learn and talk about the disaster and how they go about adapting to the disaster. Thus, a disaster subculture becomes conceptualized and named, making it real and viable. Hussain (1997) suggest the definition of a disaster subculture contains previous experience with the same type of disaster, the beliefs, and concepts of the people around the disaster forecast (warning) and the concept of damage to lives and property. He also adds that the nature of the subculture should be derived

from the disaster. Scanlon (2001) proffers that different types of disasters will bring about the construction of different subcultures based and grouped upon the specific types of disaster they encounter i.e. flood subcultures, earthquake subcultures and ice storm subcultures.

If a community is impacted infrequently, disaster subcultures rarely develop. Organizational adaptations, which emerge in these situations, are usually short lived. The experience of the disaster will pass into history and probably be forgotten unless some record was kept. Had an organizational memory been kept or a history been written and *read,* the subculture could continue (at a different level), and lessons learned from these prior disasters need not be learned again. Additionally, the organizational memory would put the perception of risk in proper context. It is a simple leap from not knowing of prior disasters to believing that disasters or risks do not exist.

There is no clear indication, however, about whether disaster subcultures lead to greater structural stability or change during role enactment (Bardo 1978). There may not be a clear predictor of a disaster subculture, although during the 2003 Electrical Blackout, people in New York remained calm. "Neighbors sat on stoops, swapping stories and bottles of water, and looked out for the elderly man living alone upstairs" (Marks, McLaughlin, and Paulson. 2003, p. 3). They developed a disaster subculture.

> There was little looting and no rioting as in the blackout of 1977, when chaotic darkness became a metaphor for its urban decline. Sociologists who specialize in disaster research weren't surprised at all by New Yorkers' orderly response to the blackout. . . . People who face crises, especially repeated ones, tend to respond in an altruistic fashion. It's the sort of culture that helps Californians, say, to smile at earthquakes, or Midwesterners to calmly go into

> tornado mode (Marks, McLaughlin, and Paulson 2003, p. 3).

The next two examples will show that people with a common experience of disasters become a disaster subculture. In the 2003 blackout people cooperated, there was little trouble, and it may have been hard to get home but it "shows you the world is coming together because of all the things that happened before the blackout happened" (Patterson 2003, p. 3).

The terrorist attack on the World Trade Center in 2001 added to the common experience. The attack impacted not only the participants working with the disaster and the families whose loved ones were lost, but also impacted all of the United States and possibly the entire world. After the 9/11 terrorist attacks, everyone who heard about them gained the experience of a disaster to some degree and became a member (if only for a short time) of a disaster subculture.

> In New York, 9/11 may have strengthened that 'disaster subculture,' equipping people to better respond to disasters in the future. The more experienced a community has with disaster, the more resilient it becomes (Webb 2003, p. 3).

Metropolitan communities have more resources and therefore greater absorption capacity when disasters strike (Wright and Rossi 1981, Pp. 3-41; Kreps 1984, Pp. 317-20). This absorption capability comes from experiencing many different disasters. Having the disaster experiences may automatically turn on coping mechanisms that allow for the greater absorption. The experience and knowledge of risks among those affected by the disaster also contribute to the resiliency within the culture or subculture.

Disasters add stresses to people and organizations. Stress may distort the explanation of experiences people gain after a disaster, their histories with disasters, and their stories about disasters. Sometimes these distortions take on the mantle of myths.

Myths play a large role in a person's perception of disasters. These may develop into constructed facts, usually misperceived, as myths are basically legends, folklores, or traditions without a basis in fact, but they do enter the culture symbolically as truth. Fischer (1998) presents the following myths that are all false but still have a following as truth:

1. Panic Flight. When a disaster is imminent or in process people flee in a panicky self-preservation mode.

2. Looting. Everything is available and taken by a criminal element just waiting for the disaster to distract the law enforcement and open the opportunity.

3. Price Gouging. Shopkeepers raise their prices, as they know their materials are necessary in the disaster related work.

4. Contagion. An instantaneous joining of the people in the looting and price gouging.

5. Martial Law. All civil law is suspended and the law enforcement agencies do not need probable cause to arrest anyone.

6. Psychological Dependency. The victims were too "out of it" to know what to do.

7. Disaster Shock. This represents another form of psychological dependency. The disaster made me do it.

8. Over Estimation. The disaster kept getting bigger and bigger with the telling.

The myths continue to sway perceptions of risks and lead to the construction of a disaster reality.

Perception of risk and organizational memory are two additional factors that help in the understanding of how the disaster subculture develops and continues in existence. These two factors allow the acknowledgement of the community or institutions to being at risk to disastrous situations or events. Both the individual and the organization develop a perception of risk at a level or degree of their understanding as they define the situation whereby they would face the possibility of some type of consequence. Ranging from a high perception of risk to no perception of risk, the degree of consequence is measurable. At the high risk level the organization would maintain a disaster subculture but at the no risk level the subculture would not exist. There could be other forms of disaster subcultures between these extremes.

Organizational memory takes into consideration different sources for development that include newspaper articles, computer information, story-telling, and personal anecdotes and memories. Planning for disasters remains a difficult proposition. This fact is especially true when people must deal with severe weather events. Organizational memory allows the organization to plan for future severe weather events based on prior experience or relevant information.

Perception of Risks

A disaster subculture by means of its commonality, teamwork, and tone or goals maintains a common perception of the risks associated with the disaster it experienced. A common perception of risk also offers a common tolerance or threshold of risk a disaster subculture would endure.

While attempting to provide a scientific basis for developing a threshold of risk or the amount of vulnerability to nuclear power the public would accept, Chauncy Starr

(1969) asked: "How safe is safe enough?" Starr and others alerted society to the inaccurate risk perceptions held by the public. Starr's (1980) main conclusions to the vulnerability or risk of emerging technology is summed up by the following:

1. A thing is accepted as safe if we think it is. Examples: We regularly drive automobiles with fuel tanks containing more explosive power than a 500 lb. bomb. We use AC electricity in our homes despite the fact that AC was originally feared because it was used to electrocute death row inmates . . .

2. People will voluntarily accept risks 1000 times greater than involuntarily imposed risks. Examples: All the things listed in item 1 plus ski vacations, circumnavigation [of the world by sailboat], skydiving, and eating fatty foods . . . (Zeitlin 2002).

Nuclear power had become a huge public concern in the 1980s and investigators tried to establish general principles relating to these concerns. According to Cross and Bogard they failed. Cross offers,

> . . . the initial commentaries tended to dismiss the perceived risks of the public as uninformed opinions to be ignored or corrected by decision makers . . ." (1992, p. 59).

Bogard adds,

> Defining hazards [risks] today has become the practical task of an elite social class comprised of corporate executives, scientists, Government officials, and safety planners" (1989, p. 10).

The public may not know the science that underlies the risks they encounter and they may have imperfect inferences about how the risk affects them, but their perceptions of what constitutes a risk is their understanding of that risk, therefore making it "real" and thus the only truth possible. The reasons the "decision makers" would discount the public's perception of the risk would be for the public's own welfare as they lack the knowledge, savvy, and sophistication necessary to understand such complex

issues and should be ignored, even though the public would ultimately have to deal with the risk.

"However, scientists can seize center stage with studies that are important to them personally but that add little to overall understanding. . ." (Fischhoff 1995, p. 191). This action furthers misinterpretation and muddles the issues and processes of risk the public is asked to accept and not necessarily understand. Alternatively, this jumbled information is all that is available or all that is offered for the public to form or construct any kind of perception of risk. The attitude proffered represents the inability of the public to think or understand what constitutes a risk. The same attitude holds true when dealing with severe weather events.

A risk can be defined as the probability that an occurrence of an event will result in damage, loss, or injury. For example,

> Flood frequencies, such as the "100-year flood," are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1% chance of occurring in any given year (Floodplain Management Association 2001).

There is always a chance that the event will not occur. On the other hand it could occur over and over. Fitzpatrick suggests that the perception of that chance amounts to the sense of the degree of risk. Along with the risk is the perception of the result (1992).

Because people have different views of a risk, they assume that the risk is based on a particular kind of risk they individually perceive (White and Haas 1975; Burton, Kates, and White 1978; Perrow 1984). Not thought of as being a risk fifty years ago, today we know that DDT and the fallout from World War II designed nuclear bombs are

now known as slow-onset risks with long-lasting consequences associated to them (Dynes 1970; Dynes and Wenger 1971; Quarantelli 1978; White 1988). The long-lasting risks developed with the changing perception of the risk. From short-term gains we get long-term problems. There are also high-risk events defined at their occurrence including flashfloods, tornadoes, and hurricanes, and these are usually short-term. The risks from these events recede as the danger passes (Beyer 1974; Weinstein 1987). Risk to organizations is problematic because differing views on what constitutes a risk, how it is defined, and how it impacts the organization often develop. The policies implemented including planned modification of their structure, would allow for the rapid adjustments to the standard operating procedures. Further, understanding risk perceptions offers the possibility of reducing the vulnerability of the organization to the risks.

At different times and in different places, perceptions of risk and what risks need attention changes. Different communities would pronounce different risks as important. Table 1 presents 41 studies of Risk Perceptions. All the studies ranked different risks as perceived by the respondents as to their importance in their lives. One interesting aspect about the table is how some risks keep reappearing in the table often at different levels of the hierarchy (i.e. things that are Nuclear).

Place Table 1 here.

Table 1 41 Studies on Risk Perceptions from 1980 - 1998

Year	Author	Highest Risk	➢	➢	Lowest Risk
1980	Slovic	Nuclear Weapons	Nuclear Power	Handguns	Crime
1981	Vlek	Nuclear Power	Petrochemicals	Drunken Driving	Chlorine By Train
1981	Winterfeldt	Car Racing	Nuclear Power	Stuntman	Motorcycles
1984	Harding	Heart Transplant	Smoking	Kidney Transplant	Overeating
1984	Johnson	Nuclear Accidents	Homicide	Airplane Accidents	Toxic Chemicals
1985	Opwis	Traffic Pollution	Industry Pollution	Chemical Waste	Nuclear Material
1986	Englander	Smoking	Alcohol	Crime	Motor Vehicles
1986	Borcherding	Smoking	Asbestos	Nuclear Power	Pollution
1987	Pilisuk	Drinking Water	Carcinogenic Chem	Pesticides	Air Pollution
1988	Teigen	Heroin	Amphetamines	Warfare	Nuclear Weapons
1988	Gould	Nuclear Weapons	Handguns	Chemicals	Auto Travel
1989	Hoefer	Nuclear Weapons	Nuclear Power	Robotics	Genetic Engineer
1989	Keown	Crime	Warfare	Heroin	Nuclear Weapons
1989	Bastide	Drugs	Nuclear Bombs	Nuclear Waste	Handguns
1989	Lappe	Smoking	Pesticides	Alcohol	Antidepressants
1989	Schmidt	Smoking	Ozone Depletion	Car Pollution	Burning Trash
1990	Mechitov	Natural Disasters	Nuclear Power	Pollution	Drinking
1990	John	Smoking	Asbestos	Nuclear Power	Stuntman
1991	Goszczynska	Warfare	Nuclear War	Food Shortage	Narcotics
1991	Rohrmann	Smoking	Asbestos	Pollution	Nuclear Power
1991	Bellrose	Stress/Depression	Cardiovascular	Asbestos	Auto Exhaust
1991	Fisher	Accidents	Diseases	Crime	Work
1991	Sjoeberg	Lung Cancer	Falling From High	Traffic Accidents	Construction Work
1993	Hinman	Nuclear War	Nuclear Accidents	Radioactive Waste	DNA Research
1993	Karpowicz	Heroin	Nuclear Weapons	Terrorism	Warfare
1993	Benthin	Cocaine	Crack	Swimming	Bicycle Riding
1993	Nyland	Nuclear Weapons	Warfare	AIDS	Heroin
1994	Rohrmann	Smoking	Tranquilizers	Asbestos	Nuclear Power
1994	Sokolowska	Radioactive Waste	Chemical Waste	Chemical Industry	Pollution
1994	Jianguang	Earthquake	Flood	Water Pollution	Air Pollution
1994	Puy	Hard Drugs	Nuclear Weapons	Warfare	Ozone Depletion
1995	Brun	Drugs	Cancer	Greenhouse Effect	AIDS
1995	Krewski	Smoking	Ozone Depletion	Street Drugs	Stress
1995	Xie	National Turmoil	Nuclear War	Overpopulation	Poor Quality Goods
1995	McDaniels	Nuclear War	Loss Of Species	Ozone Depletion	Loss Of Habitats
1995	Schuetz	Smoking	Genetic Engineering	Artificial Sweetener	Microwave Ovens
1996	Slovic	Nuclear Waste	AIDS	Street Drugs	Smoking
1996	Marris	Nuclear Power	Ozone Depletion	Warfare	Car Driving
1997	Slovic	Smoking	Asbestos	Dioxins	Nuclear Waste
1998	Rohrmann	Smoking	Hallucinogenic	Asbestos	Nuclear Power
1998	Sjoeberg	Nuclear Risks	AIDS	Narcotics	Hair Dyes

Table 1 supports the notion that the public have different opinions on what they feel are important risks to consider and that the importance of those risks can change over time. Other factor may influence a person's perception of risk.

> Perception of a hazard is an individual's understanding of the character and relevance of a hazard for self and/or community. The perception *may* include notions about the speed of onset, scope, intensity, duration, frequency, temporal spacing, causal mechanisms, and predictability (Mileti, Drabek, and Haas 1975, p. 23).

Cox adds that time, place, and impact are the defining factors when potentially destructive events are thought about (1990). These factors are generally taken into account when the personal perception of the event is formed with the attending factors relating to the degree of the risk in that situation. For example, risk communication systems supply the public with information pertaining to a potentially hazardous event and have traditionally incorporated these factors: time, place, and impact in their communications (Drabek 1986a, Pp. 71-99; Mileti and Sorensen 1990, p. 1)[5].

Operational definitions related to the development and degree of risk perceptions within organizations usually come about through the experiential knowledge of severe weather events. On a scale of High, Medium, Low, or None, the degree of risk perceptions based upon historical knowledge are measurable in qualitative terms. This method can describe and demonstrate how the organizations perceive their risk toward the onset of a severe weather event with the resulting possibility of a disaster.

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[5] Additional sources of disaster/risk communication literature. Dynes 1994; Fischbach 1998; Fitzpatrick and Mileti 1990; Fritz and Williams 1957: Kates et. al 1973; Kreps 1984, 1985; Kunreuther 1979, 1990; Turner 1976; Mileti and Sorensen 1990; Mileti and O'Brien 1992; Mileti and Darlington 1997; Oliver-Smith 1992; Quarantelli and Dynes 1977; Rosenthal and Kouzmin 1997; Ruch and Christensen 1980; Sandman 1987; Weick 1993.

Hopefully, organizations with a high risk perception will plan and implement devices to mitigate or eliminate the damages produced by a disaster. These organizations believe they will be involved with future severe weather events. In other words, such organizations do not gamble against the weather and will have established preemptive plans to cover all facets of their high-level risk perceptions. These organizations seem to have a disaster subculture in place.

An organization with a medium level of risk perceptions believes there is a possibility but not a certainty of its involvement with future severe weather events. Some mitigation devices are implemented for crucial areas of their operations. Other areas do not receive purposive mitigation measures. These organizations gamble that their operations will survive a severe weather event with minimal damages and loss.

Organizations with low perceptions of risk are organizations that believe there is a very slight chance of becoming victims to severe weather events. They do not plan to apply mitigation devices against damages. They gamble that there will not be a severe weather event that will strike their organization, or if one does strike they believe it will result in very little damage or disruption.

Further, there are organizations that lack any perception of risk at all. No perception of risk is still a constructed perception. There may be parts of the organization that feel they are at-risk, but the leaders of the organization may not know about any risks or they do know and are willing to gamble that a severe weather event is of no concern.

All degrees of the perceptions of risk relate to the organizations view of the world based on their conception of the likeliness of an occurrence of a severe event.

Organizational perception of risk emerges through different pathways. These views may result from a dictatorial approach of one person having total control and dictating the risk. Another approach involves of countless meetings and votes in a democratic style to define the perception. A third way is for the organization to form the perception *post hoc*. Another way would contain an organizational memory that would be accessed, allowing the policy makers to examine prior and similar events in the development of a perception. Finally, the organization may not care. Organizationally, these perceptions transform almost magically into hard policy with standard operating procedures. Burton, Kates and White add that to be able to adjust the procedures and policies depends on the organization's awareness and changes in perception (1978). Again, bureaucracies are stagnant, difficult, and resistant to long term change.

Regardless, reducing the organization's vulnerability (risk) is probably the most important subject to understand. Most threats, either human made or natural only become disasters when they impact the organization that remains vulnerable. Organizations can learn from experienced organizations on how to prepare for the future disaster that is certain to occur (Grigg 2002).

Changes and adjustments can be of short term such as issuing warnings for hurricanes, evacuations in the event of flooding, again, if there is enough time, and so on. The changes and adjustments can also be implemented in the long term by constructing mitigation controls, better warning and evacuation systems, land use management, community preparedness and education, and insurance practices.

On the other hand, the short term and more immediate concerns would include search and rescue, protective actions (storm cellars and sandbagging), and response to

associated hazards such as fire control, clearing drainage passages, and land or mudslides (Ayre, Mileti and Trainer 1975; Burton, Kates and White 1978; Mileti 1980).

At times long-term efforts to limit the organizations' losses may intentionally or unintentionally pass the burden onto others. For example, mitigation devices used to divert floodwaters away from the organization's property can impact others that were not impacted before the mitigation device's deployment. Floodwaters have to go somewhere downhill, and by diverting the water the mitigation devices are directing it off the organizations land and onto other people's property thus putting more and different people at risk. This action effectively diverts the historical normal and natural waterways.

The choices for organizations to enact changes and adjustments are many: doing nothing and accepting the damages, insurance planning, other mitigation devices, disaster relief, and charity are a few. There is also sharing of the burden by the stakeholders themselves by pooling resources to build water catchments within the floodplain for example. Burton, Kates and White illustrate that the most common adjustment would entail doing things to prevent the losses by decreasing or preventing the injurious effects of the hazardous event (1978, Pp. 45-49). In other words, the use of mitigation devices is an adjustment. Even with preemptive plans in place, a severe weather event can still cause tremendous amounts of destruction. Mitigation devices are built based on an expected one-hundred-year storm, one with the chance of occurring with that high intensity once in a hundred years. To attempt to build mitigation devices for a five-hundred-year storm are usually out of the question, as all mitigation devices are built along FEMA guidelines, which include a cost/benefit analysis and the cost would be

prohibitive. FEMA funds up to 80 percent of the cost of the mitigation device if the plan for the device meets FEMA's cost/benefit analysis. A 500-year mitigation device, according to FEMA officials, is rarely cost effective (FEMA 1997, 2003).

Mitigation devices are relevant perceptions of risk. All perceptions of risk are constructed based on historical information, organizational memories, and social ties. That assumes that a perception of risk is "real."

Symbols, Signs, and Perceptions

In an ever-changing world with new technology emerging, population density and changes, risks greater than can be imagined (nuclear bombs), cowardly terrorists, and so on it is necessary to understand how perceptions of risks are developed. When Chauncy Starr asked "How safe is safe enough?" he was referring not only to nuclear power but to all types of technology. In 1969 no one had a personal computer, a pocket calculator, a cell phone, or could imagine having a laser beam correct your eyesight. Things were different and in some ways more simple and more black and white. The world people knew was changing, and the change was happening so fast that people became afraid. They were afraid because they did not have the information needed to alleviate their fears or to stimulate changes in their perceptions of the world or environment around them. The only thing that seemed constant was change.

The world or environment surrounding us greatly influences our behaviors through the stimulation of the senses. This stimulus allows the formation of experiences, which in turn affect behavior through memory of the consequences. When an event triggers a memory of the consequences of prior behaviors within a similar event, people responds with the least discomforting behavior. In turn, this response produces another

memory of the consequences of the behavior supporting the earlier perception. As an interpretive mechanism based on the interaction of the person with the environment the person sees the event and perceives the consequence expanding the way the he/she feels and understands the event while constructing new memories (interpretations) for future events. Taken together, the understanding, the interpretation, and the developed perception construct the reality in which the actor lives (Berger and Luckmann 1967, Brehmer 1987, and Garson and Modigliany 1989). Shibutani agrees:

> The effective environment is something that is *constructed* in the succession of interchanges, which constitute the life process. [People] are not passive creatures at the mercy of external stimulation, to a remarkable extent they create the world in which they live and act (Shibutani 1961, p. 67).

Personal perceptions are a part of the social knowledge that is created by the collection of those perceptions (Douglas 1978, Ravetz 1984). This knowledge consists of experiences and their related consequences. A philosopher, Ludwig Wittgenstein, concludes that not everyone witnessing the same event has the same perception of that event (Monk 1990). Initially, the actors hold different perceptions of the same incident. By interactions, however, they develop a consensus or agreement of a general perception of their experience. Consensus is a construction of reality adding knowledge and/or understanding to the actor's perception of what happened.

People add meaning to a particular situation through ". . . various aspects of the environment influencing the organization of behavior" (Fitzpatrick 1992 p. 82). Their proximity or closeness to an event affect the decisions people make or do not make in preparation for future events (Fitzpatrick and Mileti 1990, Mileti and O'Brien 1992).

The environment influences the actors' behaviors while their experience and proximity to the event influences how their decisions are constructed.

Kaplan and Kaplan (1982) support this view: "The way the world seems is in no small measure a function of how we process the information we receive from the environment" (p. 32). Furthermore, Mileti and Darlington state:

> . . . disasters are not problems that can be solved in isolation, but symptoms of more basic problems created culturally and based on the ways we view the natural world (1997, p. 1).

Rayner ties this concept together:

> Natural feedback into the knowledge process is, therefore, always subjected to the conceptual massaging imposed by existing categories of thought. The combination of natural feedback with cultural constraints on the organization of information combine to form a total knowledge system, parts of which may be over-determined by either cultural or natural constraints at different times and places (1987 p. 8).

We obtain an indelible link to the natural environment through our perceptions shaped by the natural feedback plus our cultural influences or constraints. Future events are perceived as extensions of our current knowledge. "It is that perception is influenced by social categories and is a *constructive* as well as *reflective* process" (Kollock and O'Brien 1994a, p. 16). We base and shape our perceptions through our socio-natural understanding.

In Skinner's theory of operant conditioning, he suggests that future attitudes and future behaviors are produced from consequences of past actions (1971). Positive outcomes lead to positive behaviors just as negative outcomes lead to different behaviors (Whyte 1991). If an actor behaved poorly in the past the actor should behave differently

in the future, and if an actor behaved well in the past the actor can expect to behave well in the future. But, if the actor does the same thing over and over again in the same manner while expecting different results, we have one definition of insanity (Alcoholics Anonymous 2001).

We learn to interact through the use of symbols and signs that are the things we see in the world or that we are taught to see. Symbols and signs directly influence the formation of perceptions. Mead offered that symbolic gestures from others are crucial in the formation of meaning in life situations (1938). Mead (1936) also stated that the goals in a life situation are formed to restore one's equilibrium or comfort.

Kollock and O'Brien include,

> 1. Humans act toward things based on meaning they assign to the thing.
>
> 2. Meanings are socially derived, which is to say that meaning is not inherent in a state of nature. There is no absolute meaning. Meaning is negotiated through interaction with others.
>
> 3. The perception and interpretation of social symbols are modified by the individual's own thought processes (1994b, p. 54).

Other types of symbols also influence perceptions. An example is information and the data contained within the information.

> [I]nformation initially processed outside the immediate situation but conceptually brought into a current situation by the stimulus' receivers serves to influence perception formation and consequent formulation of meaning about a particular situation (Fitzpatrick 1992, p. 83).

Thomas and Znaniecki claim the interaction with the self, the thinking about how information from others is pertinent, combines with the interactions of others. These

self-interactions allow the information they want to offer to produce the actor's definition of the situation (1947). The actor can then make decisions based on historical and current data. This combined definition and perception leads to a directed action as opposed to random or leaderless action. As an ongoing process, prior decisions and consequences of prior actions influence all decisions and change as more consequences develop (Charon 1995).

People's use of symbols allows for adaptation and changes to their environment (Bandura 1986). Symbols build on other symbols. Here, the present is mixed with the past:

> [A] cluster of symbols about the past combine with whatever things we know mainly through maps, magazines, newspapers, and the like about the present" (Burke 1966, p. 5).

The combined symbols offer a catalyst to actions.

> An individual learns to act through symbols and becomes part of society through the same symbols. Communication involves conversations of gestures . . . [and] from these gestures evolve significant symbols, gestures having the same meaning in the sense of indicating the same future phase of acting to participants (Stryker 1990, p. 7).

An actor's pre-school years are not spent on instruction about the existence of a society or how social groups are organized and function. The pre-school actor would not understand beliefs or perceptions. This knowledge comes about experientially through small events "insignificant in themselves." The behavior is guided and controlled while personal relationships develop through contacts with other individuals. All this takes place through the "medium of language" (Halliday 1978).

> And it is not from the language of the classroom, still less that of courts of law, of moral tracts or of textbooks

> of sociology, that the child learns about the culture he [sic] was born into. The striking fact is that it is the most ordinary everyday uses of language, with parents, brothers and sisters, neighborhood children, in the home, in the street and the park, in the shops and the trains and the buses, that serve to transmit, to the child, the essential qualities of society and the nature of social being (Halliday 1978, p. 9).

Changes and adaptations take place as information is received, processed, and absorbed. To present information that is understandable, actors use signs that allow them access to the information. "Signs are socially standardized ways in which one thing (i.e., thought, word, gesture, or object) refers us to something else" (Fitzpatrick 1992, p. 83). Signs are also things to which one responds. The actor does not give meaning to signs, nor does the actor reflect on them, instead the actor responds to them (Becker 1962). Signs taken together form symbols and "symbols are the individual's eyes to the world" (Charon 1995, p. 60).

Risk is largely a function of how people construct their built and social environments in or out of consent with their natural environment. Humans thus set the stage for an event of nature to become a natural disaster (Mileti, Hutton, and Sorensen 1981, Fitzpatrick 1992).

Organizational Memory

Organizational memory is another component of a disaster subculture and is constructed from many individual memories that are joined together through a process of consensus, written records, media accounts, experiences, story telling, and many other factors. Organizational memory has been defined as ". . . the way an organization applies past knowledge to present activities." Knowledge management is the "acquiring, creating, distributing, and using knowledge in organizations." Knowledge in this sense is

the use of the organization's memory (IEEE 2003, p. 1066). Organizations will respond to disasters much more adequately if their organizational memory is high. The employment of memory prevents the constant reinvention of knowledge. A number of theorists have tried to assemble a list of the factors that make up an organization's memory (see Argyris and Schon 1978; Daft and Weick 1984; Hall 1984). March and Olsen (1976, Pp. 62-63) suggest that "past events, promises, goals, assumptions, and behaviors" need to be included in memory, while Argyris and Schon (1978, p. 19) believe that, "learning agents' discoveries, inventions, and evaluations must be embedded in organizational memory." Hall (1984) posits that the makeup of an organization's memory is that of a depository of cause maps, architecture, strategic orientations, and standard operating procedures. Organizational memory is based on three principles:

> 1. Information is processed from the environment (Daft and Weick 1984).
>
> 2. Organizations are both information systems as well as interpretive systems (Daft and Weick 1984; Burrell and Morgan 1979).
>
> 3. Memory is a concept an observer invokes to explain [interpret] a part of a system or behavior that is not easily observed (Krippendorff 1975).

Organizational memory "refers to stored information from an organization's history that can be brought to bear on present decisions" (Walsh and Ungson 1991 p. 61). It is an action construct dependent on the memory being used or put into action. However, if organizational memory is not constantly updated or disseminated to the organization's members, it is useless. A disaster plan, which is not practiced, is not a disaster plan.

A memory is constructed or drawn from experience or from the records of historical events. The difference stressed here is on the method an organization uses to construct a view of historical events. Memory does not exist as a direct statement or fact of what happened at some specific period. Historic events are an accumulation of perceptions and/or constructs. These events are then molded into a memory while being influenced by culture, technology, economics, the military, politics, the environment, religion, society, perceptions, and time. All these constructs, in many configurations or alone aid, restrict, redefine, and impact the representation of a memory. Sometimes facts are included. Memory, as such, is always political in that it is an agreement or consensus of what took place. A timeworn sentiment states: "the victors write the history."

Organizational memory as a construct is argued from one end of a continuum as only a metaphor ("organizations do not literally remember" Argyris and Schon 1978, p. 11) to the opposite end with Sandelands and Stablein (1987, p. 136) raising the issue that "organizations are mental entities capable of thought." One would suspect that the "truth" would lie somewhere in the middle. Walsh and Ungson add that what still needs to be settled in the theoretical realm is whether information is stored and processed by individuals who comprise the organization, by the organization itself, or by the dominant coalition or an upper echelon as a reflection of the organization's hierarchy (1991). As we can see, many factors are capable of getting in the way of or are necessary in the formation of an organizational memory.

Natural disasters in traditional societies were understood as being a normal occurrence. Over time many societies developed into disaster cultures focused on living in harmony with nature and accepting disasters as a natural event. Krisno Nimpuno

(2001) writes about the way traditional societies viewed development changes within their societies as taking place gradually with an understanding of their social, economic, and environmental conditions. Rash decisions and sudden development were deemed too risky for maintaining the natural equilibrium.

Nimpuno continues: such societies developed "a collective disaster memory [as] a vital motivating element in disaster reduction" while coping with the frequent seasonal weather events (2001, p. 1). A disaster reduction culture is difficult to establish when societies only deal with low frequency disasters such as tsunamis, volcanic eruptions, and earthquakes. But, frequent weather events akin to seasonal phenomena (floods and cyclones) are easier to remember than are the low frequency hazards when providing a basis for the disaster culture. "Coping strategies then develop gradually, often through a process of trial and error" (2001, p. 1) for the development of disaster reduction strategies. The construction criteria changes and adapts to the culture's environmental concerns. These changes represent a cooperative effort between government, local industry, and the local population. Together, they believe "[a] natural phenomenon does not cause disaster in itself, it is the lack of protection against the hazard that precipitates the disaster" (2001, p. 2). Modern society demonstrates this fact repeatedly, as noted by Weick and Gilfillan:

> Individuals as learning agents acquire information in problem-solving and decision-making activities. This focus on individual cognitive activities as the central element in the organization's acquisition of information reflects an active construction of memory. However, interpretations of problems and solutions vary with individuals. The thread of coherence that characterizes organizational interpretations is made possible by the sharing of interpretations. Thus, through this process of sharing, the organizational

> interpretation system in part transcends the individual level. This is why an organization may preserve knowledge of the past even when key organizational members leave (Weick and Gilfillan 1971, p. 179).

Weick and Gilfillan present some valuable points but one point necessary for an organization to maintain a memory requires the organization to have the desire to do so. Memories take up some resources, and decisions are necessary to justify a need to expend the resources. Information systems are a prime example.

In today's world with the advent of computerization and information technology systems, organizations generate and retain mountains of information. Keeping and maintaining all this information is simply wasting resources. People collect all kinds of things including information in hopes that someday it will be needed or useful. The justification for keeping all the information is the mentality of: "If I throw it away I know I'll need it the next day." Instead of having a garage full of "stuff" a consequence of having so much information is that the organization suffers from "infoglut." There is just too much information available. The information may provide for interesting reading to some people but not all of it is useful for more selective memory development.

The information needs examination in order to extract the pertinent memory items contained within. Not all the information saved is germane or even necessary to construct the organization's memory. As Ackermann notes,

> Intuitively, we know an organization of people should retain some knowledge of its past efforts and environmental conditions. If an organization learns, then the result should be available later [for organizational memory development] (Ackerman 2003, p. 1)

Computer records alone do not hold all the parts for the organization's memory.

The stored computer records (information technology) are only one source. Other forms include,

> . . . corporate manuals, databases, filing systems, and even stories [oral histories]. . . . individuals are a prime location for retention of the organization's knowledge. However, organizational memories can be retained in many other places, including organizational culture, processes, and structures" (Ackerman 2003, p. 1).

The organizational setting for this knowledge is social in nature. The memories are social memories with many perspectives and uses. "In fact, the area of 'social' memory has attracted considerable interest from researchers in sociology, anthropology, information science, computer science, history, and even literary studies" (Ackerman 2003, p. 1).

Organizational memory is composed of its retention facility, the information contained in it, the processes of information acquisition and retrieval, and its consequences. Individuals collect the information and apply the throughput (interpretation), and in doing so make the output retained and available for retrieval and use. The larger the organization gets, the greater its memory grows. Logistical decisions based on record keeping require more resources as the organization continues to grow. Organizational memory is also a fluid endeavor as memories change according to the organization's needs.

All of this information is costly to maintain, especially if it is not accessed and used. March and Simon argued that organizations should be concerned with obtaining their goals in a manner that minimizes the drain in limited resources (1958). Too many questions about the resources expended are not addressed. One might expect organizational memories to be employed for recent events because the existing

knowledge and the situational context do not need to be reconstructed or reinterpreted to use the information already in memory. As a result, savings on costs are realized.

Organizational memory plays an important role in the planning processes of an organization when the memories are used and taken into consideration in decision-making. City planners use the memories as a tool to seek out or establish the causes of problems or at least drive them in the direction of problem solving. Without adequate organizational memory, planning lacks an important ingredient that could prevent or mitigate a natural disaster.

CHAPTER III

RESEARCH DESIGN

The purpose of this study is to ascertain those factors that aided or hindered Colorado State University's attempt to restore the campus to a pre-disaster state. More specifically, did groups emerge to fill gaps in the bureaucratic functioning? Also, to what extent did the University incorporate elements of a disaster subculture with its risk perception and organizational memory to cope with demands placed on it by a flash flood?

Major Concepts

Recovery Stage. The recovery stage is that phase immediately after the emergency stage of the flood. Lives are no longer threatened, search and rescue operations have ceased, and there is no longer an immediate threat of further damage to property. Yet, there is much left to be done to restore the community to some degree of normalcy.

Emergent Groups. New relationships and groups emerge to cope with the demands placed on the university by the flood. Often patterned, bureaucratic procedures prove to be inadequate in the face of rapid increases in demands. New relationships within the organization, as well as, entirely new groups, emerge.

Disaster Subculture. Communities and organizations have pre-planned responses to certain natural disasters. Disaster subcultures develop most fully in communities that have previously experienced a number of similar types of disasters. By trial and error in previous disasters, large complex organizations have learned new responses to these new demands. These responses are built into the structure of the organization. They become pre-planned bureaucratic responses for the next natural disaster.

Perception of Risk. It is the extent to which organizations and the community's perception of the threat that corresponds to the actual threat posed by the flash flood. A realistic perception of risk is imperative if the community is to respond quickly and appropriately. The most realistic risk perception usually develops in a disaster subculture.

Organizational Memory. In the current study it refers to the organization's knowledge of previous floods and its ability to apply that knowledge appropriately in coping with the impacts of flash floods in the future. The organization must be able to retrieve and apply this knowledge to the situation at hand. Fully functioning disaster subcultures are able to do this with the greatest efficiency and effectiveness.

Qualitative Case Study

A qualitative case study helps answer the question; "To what extent are the concepts—emergent groups, disaster subculture, perception of risk, and organizational memory—useful in understanding Colorado State University's response to a major flash flood?" A case study appeared most appropriate to answer this question.

Case studies have been a useful research method in Sociology since the development of the method at the University of Chicago's Department of Sociology during the first third of the last century. The Chicago School was preeminent in the field and the source of a great deal of literature. The goals of a case study include a completeness of observation, reconstruction, and analysis of the cases under study. Tellis (1997) proposed that a case study incorporates the actor's views in the case under examination. Babbie adds,

> By going directly to the social phenomenon under study and observing it as completely as possible, you

> can develop a deeper and fuller understanding of it
> (1989, Pp. 261-262).

For thirty years the discipline maintained that a qualitative study was not a scientific study. In the 1960's quantitative study came under scrutiny as being limiting, obscuring some important information in seas of data and lacking the robustness of the case study. The interest in case study research became "acceptable" again. Strauss and Glaser (1967) added the concept of "grounded theory" that accelerated the use of qualitative methods. Tellis (1997) suggested that the biggest drawback of case studies was the inability to generalize the conclusions to a larger population. The ability to generalize is not a high priority for case studies they examine one event and do it in depth. Nevertheless, case studies when developed with the rigors of quantitative studies offer the same three basic tenets: describing, understanding, and explaining.

> As soon as the emergency stage ended it was time to pick up the pieces and try to put them back together again. An attempt was made "to make sense out of an on going process that cannot be predicted in advance (Babbie 1989, p. 261).

Known Participant Observation

Data for this research were gathered by several means, including participant observation, semi-structured interviews, casual conversations, newspaper accounts, memos, e-mails, and formal meetings. A unique opportunity allowed this author (Michael E. Kennedy) to get very close to the data in the role of participant observer. While the July 28th flood was still in the emergency stage, I was promoted to Water Damage Recovery Project Manager for the University. My responsibility in the position included being the overseer of the private recovery contractors for the University. I maintained a communication link, passing messages and directions to both the

contractors and the University administration. I also had access to every stage of the disaster along with access to all the people involved with the recovery process: the main contractors, the sub-contractors, university administrative personnel, deans, managers, and supervisors of the impacted areas. Additionally, I maintained communications with the administration of the surrounding city and other agencies.

In this position, I was in almost daily contact with the key decision makers at both the university and community levels. In addition, I routinely interacted with insurance companies and representatives from the Federal Emergency Management Agency. In my role as a known participant observer, I was in a perfect position to observe the process by which important decisions were made.

Sample Selection

A combination of purposive and snowball sampling were used in this study. I attempted to talk to all of the people who either were key decision makers and those who were able to direct me to them. Some were identified by their formal positions at the University; others were identified in the local newspapers; still others became part of the sample by being suggested to me by previously identified officials. Over forty people provided valuable information during the data-gathering phase of the study and directed me to other participants of the recovery effort.

An interview guide was given to a total of fifteen respondents. These included key decision makers from the university along with the members of the Management Team for planning, and the Finance Team, which included representatives from the accounting, purchasing, facilities departments, and student affairs. The interview guide was also given to the two main recovery contractors.

Instrumentation

A semi-structured interview guide was developed to obtain specific information for the present study. It included information on the recovery period in general as well as more specific information on the emergence of groups, the presence of a disaster subculture, and the states of risk perception and organizational memory. A copy of the interview guide can be found in Appendix II.

Although significant amounts of the data were collected using the interview guide, much more was garnered by other means. Grounded theory (Glaser 1978, 1994) served as a useful paradigm in tapping the emergence of new insights to better understand the University's response to the flood during the recovery period. This allowed me to observe the emergent actions, roles, and groups. Everything in view offered evidence of the newness in people's actions and the changes that were taking place in the organization. According to Dick,

> What most differentiates grounded theory from much other research is that it is explicitly emergent. It does not test a hypothesis. It sets out to find what theory accounts for the research situation as it is (Dick 2004).

The rather open-endedness of the instrument allowed maximum freedom of responses from the interviewees. The interviews were low-key and took place at the participant's offices, in restaurants, and while walking around campus. Most of the participants who were initially interviewed were re-interviewed. Eventually, the re-interviewing added nothing to what I already knew about the disaster. This point in time is known as "saturation" and is the point of diminishing returns (Glaser 1998). At this juncture the interviews ended. In addition to the information that emerged through the

interview process, much more emerged from other sources—casual conversations, on-the-scene observations, reports, and newspaper accounts.

Analysis

This effort is essentially a piece of qualitative research using the insights of a case study, and, to a lesser extent, grounded theory. Therefore, qualitative analysis or non-numerical analysis will be used to discover patterns that link the university's functioning during the recovery period to two major concepts or core categories, emergence and disaster subculture.

The interview instrument was developed for interviewing the primary participants in charge of various areas of the disaster. It was designed to uncover "key words" or "core categories." The same key words were found in the literature along with organizational memory. These key words became the core categories of this effort. The wide variety of data types and sources may also uncover newly emerging understandings of the university's response to a major flash flood.

Emergent groups and disaster subcultures were chosen as core categories as they were observed and became obvious in the interviews and conversations with the key participants. Additionally, perception of risk was drawn from the examination and analysis of the interview results. These three categories were also found in the literature review, as was a fourth category, organizational memory. The disaster literature offered up the core categories to one degree or another, and as such the literature was another source of emergent data as suggested in grounded theory.

> In short, in using grounded theory methodology you assume that the theory is concealed in your data for you to discover . . . Your aim as you read is to compare literature to the emerging theory in the same way that

you compare data to the emerging theory (Dick 2004).

Dick (2004) also suggested doing constant comparisons and to keep comparing the interviews, conversations, and observations relating to your core category. This technique assists in the development of the core categories.

Other researchers (Moore 1956, 1964; Hannigan and Kueneman 1978; Drabek 1986b; Bosworth and Kreps 1986) have also examined the recovery stage of a disaster and found some of the same factors (core categories) present, particularly emergent groups and disaster subcultures.

An analysis of all the available sources showed the core categories emerged. For this study they are emergent groups and disaster subcultures with the perception of risk, and organizational memory as sub-categories of disaster subcultures.

The following chapter presents the findings of this effort and tenders some conclusions by describing, understanding, and explaining the core categories and their relationship with the University in the recovery period.

CHAPTER IV

FINDINGS AND ANALYSIS

To help understand the findings and analysis of this study a description of Colorado State University's organizational structure and the role of the administrators seems necessary to be put the organization into context.

The Organization

Colorado State University is a traditional bureaucracy (Weber 1947), and is highly specialized, has a hierarchical structure, is based on technical competence, has written rules and regulations, and has an impersonal orientation. The two main sectors of the University are the administrative and academic sector and the facilities management sector. The former is in charge of the budgets and academia and the latter with the physical infrastructure.

Two Emergent Administrative Teams

The flooding disaster changed the hierarchy into a lateral formation rather than a normal vertical hierarchy. Communication was partially maintained but only in the horizontal tiers, managers to managers, or supervisors to supervisors. The President appointed a Vice-president (VP) to oversee the recovery effort. The VP directed that all decisions, down to the smallest detail, were to go through him. Ordered by the VP, the other Vice-presidents, Deans, and Department Heads formed a managerial disaster-planning group called the "Planning Team." Its task was to plan and oversee the University's response to the flood. The VP was in charge of this group as they attempted to initiate planning efforts and ideas, (i.e. better use of space in the damaged buildings),

during the recovery and post recovery operations of the University. The Planning Team was not out in the field they were more a "think tank."

The VP also appointed university employees to a second team. This was the "Finance Team" and this team's responsibilities included for the financial and business aspects of the recovery. They dealt with the tangibles or details out in the field. The "Finance Team" was the management presence in the field. They took control of the business and recovery matters. They authorized tasks, purchases, acted as referees in disputes between the department managers and the construction crews, worked with Federal Emergency Management Agency (FEMA) and the insurance companies, and provided guidance to the supervisors and their employees. The Finance Team hired two private disaster recovery companies without competitive bids; one to plan and supervise the tear out and clean up of the damaged structures while the other gave direction to the reconstruction of the University. In turn, these two companies hired all the subcontractors to do the physical work. The Finance Team appropriated an employee (myself) to work in the field helping the contractors and the administrative interests, such as trying to keep the "redecorating" costs down, specifically in the Student Center. I was given the title of "Water Damage Recovery Project Manager" and I reported to both the Finance Team and the VP.

Insurance and FEMA

Within twenty-four hours following the end of the flooding, the media and insurance investigators and agents descended on the University. When the President of the United States declared Fort Collins, including the University, a disaster area on August 1st, FEMA became an active participant in the recovery stage. The State carried

the insurance for the University, which covered all direct flood expenses. FEMA supported 80 per cent of the cost for construction of physical mitigation devices in an attempt to limit future flooding damages. Prior to the flood, the insurance polices provided the only mitigation or prevention device the University maintained.

The next section offers information about the flooding in both Fort Collins and the University. It will briefly explain and provide examples of the emergency and recovery stages of the disaster.

The Flood

The Storm That Produced the Flood

The Colorado Office of Emergency Management (2004) described the storm as "500-year event." Grigg (et. al 1998, p. 123) states:

> During the summer months, all of Colorado is subject to convective thunderstorms. When sufficient humidity is present in the atmosphere, some of the storms produce large amounts of rainfall in short time periods. The moisture sources [are] the Gulf of Mexico and the central plains states [allowing] moisture to drift into eastern Colorado and monsoon wind circulation [brings moisture] in the mid-late summer from Baja California.
>
> In July 1997, tropical moisture streaming northward across Mexico at the southwest into Colorado. At the same time large high-pressure area stalled over the central high plains of the U.S. This systems clockwise rotation pumped very humid air from the central plains and Gulf of Mexico into Colorado. A cold front, associated with the high pressure area over the northern plains provided a trigger to set off thunderstorms as the moist air masses converged on Colorado.
>
> At 6:30 p.m. on July 27, 1997 intense rains began in the foothills west of Fort Collins. Wind from the east and southeast continued to pump moisture into the storm system. The core of the storm was very small but remained stationary over the headwaters of Spring Creek, the Fairbrooke Channel, Clearview Channel, the West Vine Drainage Basin, and the Colorado State University Drainage Basin. 10.2 inches of Rain at Drake and Overland trail fell in five hours.

The rain continued off and on the next day, occasionally reaching "the heaviest rainfall in memory" an intense six inches an hour between 8:30 and 10:00 p. m. "After this awesome crescendo of rainfall, the rains ended mercifully and abruptly between 10:00 and 10:30 PM in Southwest Fort Collins . . ." (Grigg et. al 1998, Pp. 125-126).

The Storm Hits Colorado State University

The rains began to fall over Fort Collins in the early evening of July 27, 1997. Precipitation is a common summer event and it often rains heavily at least once a day. "You know you get a rainstorm, it gets real bad and then it tapers off" (Levy 1997, p. 31). This storm was different. At 3:00 p.m. a thunderstorm to the northwest and west of Fort Collins began and continued into the evening. The rain from this storm was measured at 2.42 inches, none of which fell on campus. The ground in the watershed to the west of CSU was saturated. Around 10:00 p.m. another thunderstorm began, this time on campus. It lasted for half an hour dropping .50 inches of rain. "Somewhere around 0100 [a.m.] MDT Monday [the 28th], [the] rain began again. Without the excitement and fanfare of lightning and thunder, steady rains developed – not hard enough to wake most sleepers" (Doesken and McKee 1998, p. 203).

The Flooding Began

That night the rain continued to fall. Off campus, the already saturated grounds produces rain runoff that began to cause problems. "While the storm was remarkable, the runoff was at least dramatic, and some peak discharges exceeded estimated 100-year flows by a factor of ten" (Grigg et. al 1998, p. 127). A trailer park was flooded and the force of the floodwaters moved all the trailers off their mountings. Explosions and fires began, as the gas lines broke free of the floating trailers. The county Search-and-Rescue

was called in to rescue people holding onto telephone poles or sitting on the floating trailers. The increasing water flow was developing into a flash flood as it kept gaining volume and speed. More streets began to flood.

Levy, Battalion Chief Poudre Valley Fire Authority, continues,

> I'm talking about people were driving along, next thing that they know they are floating with the current. This was not your typical flood where you drive across it, and you kind of get to the other side and go, "I got my carpet wet." Now try to imagine driving home from work . . . Life is good, little bit of rain, because in Colorado we are used to seeing some of that wet road. The next thing you know you're floating. Somebody drives by, creates a current, and you are upside down (1998, p. 32).

The Emergency Stage

According to Levy, "hundreds of people were rescued from overturned and floating cars and pickup trucks." Unfortunately, five women could not be saved. This tragedy occurred when the trailer park was devastated by the overwhelming floodwaters, trailers were torn off their mounts producing explosions from the natural gas connections as they were torn off the trailers. The current was too strong and the women could not escape the floodwaters and were carried downstream in Spring Creek and drowned. Ian Green a trailer park resident said, "the water was pushing everything around, cars, trailers, trashcans, everything. I don't see my trailer anymore. Everything's gone. I had to try and save a guy hanging onto a telephone pole near to a floating trailer. The current was just too strong."

Flooding began to take place on campus. Parking lots flooded and tremendous volumes of water were flowing across roads, clearing paths as they went.

Levy had a call from Colorado State University that said, "I've got 3,500 kids at Moby Arena who need to get transported out because it was raining. You need to bring

the Poudre Fire Authority Navy" (p. 32). The kids were scheduled to be in the Student Center, but Mike McCormick, from the University's housing operations department, made the decision to lock the kids in Moby Arena. He said, "I made the decision to lock all the doors. I didn't want the kids to wander out into the flood." The water outside was three feet deep and flowing at over 1600 cubic feet a second, faster than the Poudre River runs during the spring runoff. There would have been horrific consequences had the kids tried to walk through the water.

One of the cafeteria crews reported to work early the next morning and found the power and natural gas lines were out of commission. They heard about the 3,500 kids still in Moby Arena and they decided they would fix 3,500 box lunches and have them delivered to the kids one cook said, "they gotta eat" (McCormack 1997, Morris 1997).

A railroad embankment crosses campus and continues on to the south. Water formed a pond behind the entire length of the embankment from the campus south to where Spring Creek would pass through the culverts cut through the embankment. At the southern portion, the Spring Creek portion, the embankment was designed to hold back and pond up the water that a 500-year storm would produce. Culverts had been cut through the embankment and were designed to regulate the flow of water and to provide adequate drainage for a 100-year storm but not for a storm of this nature. Hilmes notes,

> The water had to go somewhere. It could not fit through the culverts under the embankment that were designed for the 100-year flow, and the water overtopped the embankment (Hilmes 1998, p. 13).

One of the culverts had been plugged in 1989 to allow for the creek, usually a slow moving trickle of water, to change its direction of flow farther to the south. On the opposite side of the embankment was the trailer park. As the water was going over the

top of the embankment, the pressure on the culverts was tremendous. The culvert outlets went through the trailer park and the 1989 plug blew out suddenly releasing huge volumes of water that smashed into the trailers (Hilmes 1998).

At CSU there is only one culvert cut through embankment and it is called the pedestrian tunnel. Wayne Charlie, a CSU Engineering professor, said, "it looks like the embankment replaced a wooden trestle somewhere around 1925." If it were still a wooden bridge the water may have passed through instead of backing up. Somewhere around midnight of July 27th the VP wanted to see what was happening on campus.

> He [the VP] drove further east and parked near Spruce Hall, then walked down Mason Street, where he heard a thunderous noise. The pedestrian tunnel that runs under the railroad tracks behind Johnson Hall had turned into "a hydroelectric spillway," he recalls. "It was dark, but the water was boiling enough that you could see a white cloud of water flying through the tunnel." (Hayes and Minor 1997, p. 8).

To make matters worse, a Burlington Railroad train was traveling on the embankment. As the train was traveling south a portion of the embankment beneath the train washed away causing part of the train to derail causing John Morris, CSU's Manager of Facilities Operations, to exclaim 'What next?" One of the derailed cars contained chlorine gas. Fortunately, this car did not leak and was back on the tracks the following afternoon. Levy finalizes the emergency stage, "The last rescue, I believe, occurred somewhere around 02:10 the next morning."

The Rain Ended

On campus, the rain tapered off between 6:00 a.m. and 7:30 a.m. but began again around 8:00 a.m. before finally ending around noon on Monday July 28th. Monday afternoon the weather forecasters finally predicted "locally torrential rains."

Forty buildings were flooded on campus, four of which were flooded by the rising pond of water at the railroad embankment. The water rushing through the pedestrian tunnel behind Johnson Hall scoured out a hole at the end of the tunnel that was six feet wide, ten feet long, and ten feet deep. Other streets were torn up and structures including the softball field and roller hokey rink were destroyed. Morris noted,

> The storm impacted 200 staff, faculty, and graduate students, and to many, their lifetime work was impacted . . . . We have professors who had 20 or 30 years invested in their lives washed away and they have to start over . . . (Morris 1998).

The water began to recede before it actually stopped raining somewhere around 7:00 a.m. signaling that the emergency stage ended on campus, the flooding was over, the water was receding, and the University accounted for all its people.

The Recovery Stage

When the safety of all the people on campus was assured, the University entered the recovery stage. Over the years CSU employees from Facilities Management frequently had to pump out the water from basements, utility tunnels, and elevator sumps following summer thunderstorms. As soon as the rain began to taper off they grabbed their pumps and began pumping the water out of the flooded buildings. This time there were more buildings than pumps and it took almost a week to pump out the water.

All of the damaged buildings were placed off-limits until their structural integrity and safety could be assured. Communications were lost as the electricity and telephone systems were out of service. All communications was carried out through face-to-face encounters or hand written messages. The CSU police department had to transfer their 911 operations and dispatch operators to the Fort Collins's police dispatch office because CSU's police headquarters were completely under water.

The Book Store and Library

A small propane-powered front-end loader was brought to the University Book Store to plow out the destroyed textbooks and shelving. The force of the water flowing through the bookstore piled everything against one wall. People began to get sick and did not know why until someone realized that fumes from the front-end loader's exhaust that was the cause. An electric front-end loader was brought in as a replacement. No one else became ill after that.

All of the textbooks slated for the fall semester were destroyed, and the semester was due to start in three weeks. All the textbooks and supplies were reordered and a makeshift bookstore was put in place using donated 40-foot trailers. Here the textbooks were sorted by College and stored. Book Store employees would go into the trailers and gather up a student's order of textbooks.

The west side of the library was directly in the path of the floodwaters. The power generated from the floodwaters literally blew a hole in the basement wall of the library large enough to drive a car through. Almost a third of the library's collection, more than 465,000 volumes, was in the basement. The floodwaters filled the basement to its ceiling damaging the books and destroying the entire building's electrical, air conditioning, telephone, and water and steam distribution systems. "I'm dumbfounded. I just got here and this happens," said Camila Alire, Dean of Libraries for only three weeks.

The library staff wanted all new books to replace the flooded volumes. But, because of the insurance policies, they had to try and recover as many volumes as they could. A freeze-drying process was going to save as many books as possible. Emptying

(packout) of the basement took weeks. At one time there were 1,000 temporary workers filling boxes with waterlogged books and placing them in refrigerated trailers. Fort Collins could not supply the necessary temporary workers. Many were bussed from Denver and the surrounding cities. After filling a trailer, liquid nitrogen was pumped in to flash freeze the books. More than 100,000 boxes of frozen books were sent to frozen food distributors, roughly half to Laramie, Wyoming and the other half to an outfit in Fort Worth, Texas. The freeze-drying operation was in Fort Worth.

Thousands of volumes were washed out of the shelves and lay piled on the floor. The floodwaters had reached a level above the ceiling tiles in the 10-foot high basement causing the ceiling tiles to fall on top of the books already on the floor.

Many people including, library staff, administrators, insurance adjusters, recovery workers, and curious bystanders unthinkingly walked on top of the piles of books on the floor. The piles were turned into mush. Hundreds of books were lost before the library was put off limits until a way was found to recover the rest of the volumes. A decision by the administration concerning the fate of the waterlogged volumes did not occur for more than a week. By then, the University's Environmental Health Department had identified seven kinds of molds growing on the books. Some were a foot long. Julie Wessling, Assistant Dean for Public Services, understated, "We've got a big job to do."

1500+ Computers

On the third night of the recovery after all the 1500+ computers had been picked up and delivered to a rented off campus warehouse, the VP called me on a cell phone to see if I was still working. It was 2:30 a.m. and I was. I told him that some of the academic department business managers wanted to know when they would start receiving

money. VP Bomotti told me to "get a 55 gallon drum of Valium and put it in their drinking water." I was not sure if he was serious or not.

The 1500+ computers were going through a process of drying them out to stop the effects of the floodwater on the circuit boards. Next, they were taken apart and cleaned by hand with water or alcohol. The clean parts were then put into an oven to dry before being reassembled and distributed back on campus.

CSU Employees Arrive

As University employees began to arrive on campus either to look or to work if they could. All Janice Lennihan, Administrative Assistant, could say was, "Oh My God." These employees began working by trying to salvage what they could from their work areas. Others went to find out specifically what they could do, and still others just watched and commented on the manner of the work being done. These groups emerged without leadership or prior planning. Neither the University's normal structure nor its planned modification in structure (disaster plans) was operating.

Communication Problems

The following events were observed during the first week of the recovery. Orders were given to the employees that were often contradictory (i. e. one supervisor would order all the waterlogged equipment to be taken out of the flooded buildings and another supervisor would order the employees to put it all back in the buildings). The contradictions came about because some departments had more than one supervisor or neither knew what the other was doing. Middle managers were not quite sure of what they had to do. Gary Goss, University Comptroller, said, "We just have to keep trying to fix things until the contractors are in place." Communications with nominal directions on

what to do flowed downward from the Planning Team. Also, hand written messages went unanswered or were not received by the people who needed them. The employees in the flooded areas were at a stage where they wanted directions on what to do. Some of the orders they received were given to keep them busy and make them feel they were helping, even though the ordered activities were useless. An example of this was when employees were ordered to put all the computers back into the building immediately after they had just taken them out.

With a Planning Team in place, information and direction should have begun to flow downward. Their charge was to develop the overall plan of operations as they went along including how the insurance money should be spent and how much money each impacted department should receive. As plans were developed, such as moving property from flooded faculty basement offices to a non-flooded floor and moving the classrooms to the basement, another plan involved how to get the waterlogged negotiable promissory notes dried, and yet another plan on what to do with the damaged computers (more than 1500), the problem with communications again became obvious. The plans could not be sent through normal channels because of power outages and the phones were out. And as often as not, by the time the message arrived to the proper person the situation had changed and the messages were irrelevant. In the first example, the contractor moving the offices from the basement to the non-flooded floor had to track down someone who knew which wing, North or South, they were supposed to use. The blueprints had been hastily drawn and did not indicate direction. The negotiable promissory notes were to be taken to company A for freeze-drying on campus. Instead they were almost given to company B for freeze-drying in Texas. To make matters worse, these promissory notes

were bearer promissory notes and could have been cashed by anyone in possession of them. The University's security people were not sure where the promissory notes were. All of the 1500+ computers were supposed to go to a special refurbishing plant set up by a subcontractor who specialized in flooded computers. Two departments hired a different subcontractor who was not approved by the insurance companies. Another department took all the computer processors out of the computers and dumped the remaining parts. These problems were all due to the confusion caused by poor communications. After the correct wing of the building was identified, the promissory notes were found still in their original location and sent to the correct freeze-drying company, the two unapproved computer subcontractors were fired, and the computer processor chips were returned. The only successful communication was face-to-face meetings between supervisors and employees.

The lack of adequate communication prevented the release of information to the employees who wanted to work. The VP was in charge of the overall recovery but no administration leader took charge of the operations end of the recovery. Groups of workers filled this void. They were effective in cleaning out the damaged buildings. In some cases they were using shovels to remove mud and soggy paper from their buildings. Wet equipment and furniture was taken out of the buildings and then put back in, then out again. Different supervisors with different goals were ordering the workers. One segment of the regular employees came to campus, saw the damage, and immediately went home.

Emergent Groups

We will address several questions in this section. Who was in charge? What groups emerged at CSU? How effective were the groups? What happens to emergent groups when the University returns to a more normal structure?

The next morning after the rains had stopped, several areas of the campus were literally lakes with cars submerged or bobbing in the water. Many basements were flooded to their ceilings. Facilities Services' crews were setting up pumps for basement pumping. That was the extent of the initial response. Nothing else could be done to the physical infrastructure until the buildings were inspected for safety.

It took hours for Facilities Management and Environmental Health to inspect each building as water was still flowing out of them. In some buildings the safety factors (i.e. floors or walls threatening to collapse) kept them closed for days.

Not knowing if any overall plans were in existence or what ones were in the planning stages, the regular employees tried to work. For example, some employees started to lay waterlogged forms on the grass to allow them to dry and attempt to salvage them. Being a government agency and understanding budgets, these employees did what they could to save the University money.

Most people stayed in their "home areas" on campus where they received contradictory information. For example, one supervisor would give the instruction to stack all the office chairs at one end of the building, then another supervisor would order them to take the chairs either back into the buildings or move them to the other end of the building. Similar situations happened over and over again.

Groups emerged within these areas based on tasks that employees believed needed to be done. In some instances roles would emerge individually when an employee did not wait for direction; instead he or she would just start doing work that needed to be done such as rescuing equipment that was above the flood line. Other employees would join in and a group fully emerged. Each group had a separate common goal or a specific mutually agreed upon set of roles that was different from other groups. Not all of the groups were effective. Some managed to get in the way of other groups by crossing an imaginary boundary onto a different group's claim of space ownership. They also got in the way by doing nothing except criticizing the administration or their direct supervisors for not knowing what to do. I observed three main categories of people based on the type of activities they undertook during the recovery stage: Doers, Achievers, and Seekers. These categories of work groups emerged in different departments across campus. Not every department had all three of the emergent groups, but in general the following groups played major roles during the initial recovery stage. Additionally, two other employee groups were identified, the Lookers and the Leavers. The latter never fully emerged as functioning groups, but rather they were very loose groupings of employees that came together for a time but remained unorganized. These groups were present in a variety of different areas of campus.

Employee Emergent Groups

1. *The Doers* – this group of regular employees took on any task that would enhance the damage recovery in their home areas. They actually went to work and were effective even though no supervisor was present to direct their activities. They worked without question and responded positively to the supervisor's orders even

if the orders were contradictory. The group removed soaked furniture from a building and put it back when asked. Then they moved on to another task such as rescuing equipment that had not been flooded. Or doing an inventory of the equipment and furnishing piled outside of the flooded building. They also did the dirty work such as moping a muddy floor or cleaning a flooded bathroom. This group found work to do when no supervisor was around. The Doers were definitely an effective group. They did not wait for directions and they did not complain. Occasionally they did things that were not necessary. Effective is not the same as necessary. The placing of forms on the grass to dry may have been effective in that it may have saved some money but it was not necessary. The insurance companies would pay for the replacement forms but the message never was passed on to this group. The Doers could be sidetracked into doing unnecessary tasks due to lack of communications. They would go to any area that had work to do, if asked. Overall, this group worked effectively on the recovery. I heard some of them asking "what's next?"

2. *The Achievers* – they performed what someone perceived as necessary work and they did it in an efficient manner. They often worked on tasks that were very beneficial for the recovery effort. For example: they recovered the original promissory notes from the flooded safes and moved them to a document drying and recovery sub-contractor. That is once they were able to find the drying center. They worked without being told what to do. The Achievers saw what was necessary to get done and they did it. The group would direct the supervisors; often persuading them into believing that the project they were working on was

necessary. The group was effective and efficient. Their work was completed in their "home areas" and they recognized their ownership issues within these areas. They never moved away from their home areas and they were resentful of someone other than their supervisors who told them what they should be doing. Their biggest problem was the Achievers ran out of tasks and just stayed around their area until someone thought of another task. This group was different than the Doers who would go to the work outside their home areas and not wait idly for another task.

3. *The Seekers* - In no discernable way were these University employees going to do any work until they sought out their supervisors and received good solid direction and assignment of roles. Lack of instruction at the supervisory level coerced these people to seek out someone who might have the information they wanted. They did not care if tasks were directly identifiable in their home areas. They had to have the "OK" from someone they could blame if the task was done incorrectly or if it was unnecessary. They were convinced that someone had the information and that someone was available to give the orders. This group knew that the management was keeping information away from them. They also complained when the information from a higher management position was overridden by an even higher management position. They spent most of their time trying to track down someone they thought knew what to do or the Seekers would take on tasks that made them look like they were always busy doing something. This was just a smokescreen. They did not do a lot of work. They did succeed in doing a lot of walking and talking.

4. *The Lookers* – This group got in the way. They were not going to work unless they had a specific plan and a supervisor who knew what to do and would directly supervise them. They stayed on the sidelines as much as possible. The Lookers would not venture out of their home areas claiming the other areas had people already doing the jobs that needed to be done. Even in their home areas they were a distraction as they verbally evaluated the work being accomplished. Their criticisms were pointed and worthless as they instructed the other groups in the "correct" way to do the job. They were self-proclaimed experts who physically sat and watched others working except when their supervisor was in the area. Any work this group did was usually ineffective and inefficient. In more than one case a member of this group "graduated" to the final group.

5. *The Leavers* – This group was easily recognized by their absence. They arrived on campus, saw the mess, and went home claiming the tasks that needed doing were not in their job descriptions. Three accountants said, "We're going home." Some of them would return to campus and see what had changed. They decided that nothing had changed then leave. When asked, they could truthfully say they were physically present. It was just that they were physically present to see what changed. This group accomplished nothing.

Until the administration could resume effective operations the emergent groups (those that worked) proved the group's worth in its effectiveness while filling the void that became apparent when no one stepped up to the leadership plate.

Management Emergent Groups

At the beginning of the recovery stage the VP attempted to take charge by forming; 1) a Planning Team made up of other Vice-presidents, the Provost, and departmental managers, and 2) a Finance Team made up of the University's Comptroller, Purchasing Manager, Insurance person, a Facilities Services Manager, and two Assistant Vice-presidents. Unfortunately, the Planning Team and the Finance Team members had never experienced any kind of disaster. These two were classical emergent groups with no prior planning in their eventual structures.

Additionally, none of their members had any experience with a flood of this magnitude, and no one knew what to do. The University attempted to address the demands placed on it during the recovery stage. Their only written guideline was CSU's Severe Weather Plan (standard operating procedures) that provided the organization with a plan that was inadequate for a flooding event because it was primarily designed to respond to snow storms (see Appendix VI). It was highly adequate when someone wanted to know which street the snowplow should plow first. The phone-tree (in the procedures) became useful when the phones were brought back on-line. In 2003, other severe weather plans were added the procedures (Appendix VII).

Within a week or two after the flood the most immediate tasks had been completed. The University began to reestablish much of its normal structure and functioning. Most of the emergent groups ceased to function. The Finance and Planning Teams continued to operate effectively helping to restore the University to its normal state. Only certain people, the most effective in the employee emergent groups, kept working on the recovery while the rest of their group returned to their regular positions.

The Finance team was supervising these group members. When they completed the tasks laid out for them by the Finance Team they returned to their regular positions.

Emergent groups filled an important role in a disaster's recovery period. They took charge to fill gaps that CSU was unable to fill. Over and over again, the emergent groups proved to be effective in their roles.

Disaster Subculture

Did CSU have a disaster subculture? A disaster subculture did not exist at CSU prior to the flood at least not one that would help prepare for the massive flood that struck the community on July 28th. At the time of the flood, no one at the University I spoke to could remember any similar disasters having occurred. Forty-six years had past since the last disaster. No singular organized archive of information on prior flooding disasters existed at the time of this event except a photographic archive maintained by CSU's Photographic Services. CSU's disaster plans were totally inadequate. The University did not meet the criteria specified by Hussain (1997) who suggested the definition of a disaster subculture contains previous experience with the same type of disaster, the beliefs, and concepts of the people around the disaster forecast (warning) and the concept of damage to lives and property. Neither did CSU meet Weller and Wenger's (1973) definition of repetitive disaster impacts, a disaster agent, which regularly allows a period of forewarning, and the existence of a consequential damage that is salient to various segments of the community.

The University incorporated the concepts of perception of risk and an organizational memory into different areas of campus. CSU did have some perception of risk that led it to develop a disaster plan for snowstorms and minor flooding, but nothing

that prepared it for a flood of this magnitude. Different areas of campus now have an organizational memory. The Water Center maintains many photographs of the flood. The Business and Financial Services have a financial history in filing cabinets. And the Computer Center has miles of tape with miles of information. In sum, CSU did not have a well-developed disaster subculture.

Toward a Disaster Subculture

Did Colorado State University exhibit any characteristics of a disaster subculture, one that might help cope with a major flood in the future? Employees in Facilities Management did have experience dealing with more minor floods, which periodically hit the campus. If there was a quasi-disaster subculture, what niche would it fill?

Although no disaster subculture existed before to the flood, at least three elements of one existed prior to the flash flood. The first element of a subculture uncovered was CSU's request to the state legislature for $2.4 million to upgrade the inadequate drainage systems on campus. The Facilities Management Department knew that serious drainage problems existed. John Morris concurred, " some of the drainage pipes were so root bound that I doubt any snake could get through let alone water." Second, a 1996 water flow map commissioned by the Facilities Management Department accurately showed where the flood would strike when one occurred. CSU was directly in the path of even a moderate flood. Third, the Facilities Management Department had a great deal of experience dealing with frequent minor flooding of basements, utility tunnels, streets, and parking lots. Whenever an area became flooded, Facilities Management employees knew what to do and how to do it. In the recent flash flood, these workers immediately responded to the flooded buildings and began pumping the water out. There were just too

many buildings (40) that were flooded, and they could not keep up. When private recovery subcontractors arrived on the scene, the Facilities Management employees filled their niche where they supervised the final pumping of the water and the removal of the damaged floors, walls, and in four or five buildings, the ceilings. It is possible that Facilities Management's previous knowledge and experience with water related incidents, coupled with their experience in the present flood might lead to a more comprehensive disaster subculture better able to cope with a major flood.

Perception of Risk

The perception of risk or threat allows organizations to determine the amount of flooding risk they are willing to endure or assume, and it also offers a way to measure the threat as the organizations perceives them. This perception construction relies on an adequate organizational memory, documented historical encounters, and disaster experience found in prior flooding episodes. First-hand accounts and story telling add robustness to the development of the knowledge surrounding the prior disasters. It is possible for organizations to develop more realistic perceptions of risk. Four degrees of risk could be developed from the literature on previous disasters. Each degree implies the level of protection necessary to prepare adequately.

1. None -- the administration believes that there is zero risk of flooding capable of causing damage to the infrastructure. Therefore, no protective devices are deemed necessary.

2. Low – here the administration perceives there is the possibility of some risk of flooding but would do nothing to prevent damage should a flood occur. They believe that if there was flooding, the amount of damage would be minimal therefore, no protection devices are needed.

3. Medium – the administration believes that the risk is real and puts preventative devices in place to lessen the risk. The administration would expect some flooding and would gamble that minimal damage

would result from the flooding because they had protective devices in place.

4. High -- the administration believes that there would be extensive flooding and damage unless protective devices were established. Here is a situation that is really a gamble. Without protective devices the damage would be extensive. The administration is willing to accept the risk and gamble that damage would be acceptable even though they knew that the risk was high. With limited budgets they have different priorities.

The usefulness of these four categories received further support during the current flood from interviews, observations, and through the casual conversations and discussions with the insurance companies and FEMA representatives. In the interviews the interviewee offered key words and phrases (i.e. I never heard about other disasters at CSU). Other interviewees stated that they heard about the disaster on the radio and never knew they were exposed to a risk; or they were vulnerable; or they didn't know this was such a hazardous place. In the casual conversations and the discussions with the insurance and FEMA representatives the key words and phrases offered the foundations for constructing the four categories. The insurance and FEMA representative with their experience in disasters often used disaster jargon key words including risk, risk management, hazards, unknown hazards, vulnerable, vulnerability, over topping, sheet flows and so on.

Colorado State University's perception of risk was somewhere between none and low. This conclusion was based on the interviews with the key participants in the administrative sector. As none of the key participants in this group knew of any prior flooding disasters occurring at the University their perception of risk was zero. A perception of risk requires a risk or threat to be acknowledged.

Prior Minor Flooding

Other interviews with the key participants of the Facilities Management Department showed that they had experience in dealing with the frequent minor flooding incidences. John Morris, CSU's Manager of Facilities Operations, said, "We have employees that know that they will need to pump out some steam tunnels, or basements, or elevator sumps if we had a heavy rain. They would just do it." These employees saw the damage that happened after these minor floods. None of the interviewees in this grouping had knowledge of prior flooding disasters, but they indicated that there was a possibility that the flooding could get worse than what they were used to handling. They held a position that their perception of risk was high. They knew there would be more flooding and that the University was located on a flood plain.

A year before the 1997 flood, CSU's Facilities Management commissioned an engineering study that mapped a probable flood route through the campus should one occur. The report, based on a 100-year flood, provided a map of the route a flood would follow. The University's Facilities Management Department knew that the campus drainage system was in need of an upgrading. This upgrade became evident from the minor parking lot and street flooding after short heavy thunderstorms but not with a thought of a disaster related flooding. A follow-up study a year after the 1997 flood, done by the same engineering firm, showed how prophetic the earlier study had been (Ayres and Associates 1998). The maps of both of these studies are included in Appendix V.

Off campus development played a role in the amount and intensity of floodwaters

entering the campus. As a part of the Ayres and Associates 1998 analysis, a comparison was done that evaluated the developed land west of the CSU campus and a model of the same land when it was mostly farmland as seen in 1937 aerial photographs. The results showed how the developed land produced approximately 40% greater water flows onto campus than the undeveloped land (Ayers 1998).

Perception of risks also played a role in emergent groups. An attitude of stewardship came forth from the emergent groups based on their attempts to save everything possible and to eliminate any risks or safety problems they encountered within their home areas.

Fischer (1998) found that eight commonly held beliefs about disasters were all false. Our present research supports his findings with one minor exception: looting. These findings are important because communities must decide how to allocate limited resources in fighting the disaster. To allocate precious resources to non-existent problems means that fewer are left to address "real" issues.

1. **Panic Flight**. The only flight that occurred during the flood was that of the three or four people in the library basement as they ran for the stairs. A wall began to breach and water started to enter the basement. They were running for their lives but they were not in a panic. There was no panic flight.

2. **Looting**. Water-damaged equipment and furniture were piled outside of the building in which they were located pre-flood. There were some thefts of desk chairs and other furnishings and equipment. This was not looting. I spoke with three people who were each carrying a soaked desk chair. They explained that they thought the chairs were just being thrown away. When this was discovered more security was added which ended the "looting."

3. **Price Gouging**. The supplies and equipment needed to clean up after the flooding were priced in an agreement with the insurance companies. Every contractor or sub-contractor has an item-by-item cost sheet that is approved by the insurance companies prior to their being hired. This list includes supplies, equipment, and wages, and allows the insurance company to save money by not having to do the day-to-day accounting. All the costs are up front.

4. **Contagion.** An instantaneous joining of people in the looting and price gouging did not happen.

5. **Martial Law**. None.

6. **Psychological Dependency**. The victims were too "out of it" to know what to do. No one at the University seemed "out of it." There were a number of emergent groups, by their own choice, that did not participate in the recovery effort but this was not due to psychological factors. Some people expressed to Oltjenbruns (1997) that they were stunned or confused.

7. **Disaster Shock**. This represents another form of psychological dependency. Most people expressed surprise although some faculty members who had lost up to thirty years of work experienced a shock. One professor lost a 300-year-old bible. They began to dig out from under the flood trying to salvage what they could.

8. **Overestimation**. The disaster kept getting bigger and bigger with the telling. This happened to some degree, especially in the Student Center and the Library whose losses kept mounting. I worked with the insurance companies' forensic accountants and was confident that the accounting was a true representation of the loss and not "padded" or "over stated." The talking about the disaster was another story.

Three years after the disaster the University put the finishing touches on their mitigation devices. FEMA paid 80 percent of the costs, and the remaining 20 percent was paid out of the insurance proceeds. The establishment of the mitigation devices meant the University's perception of risk had changed. Arguing for the devices it became obvious that the CSU administrators knew that without them the damages from another flood would be even worse than this one. Two of the mitigation devices, the wall at the library and the earthen berm behind the Student Center were designed to withstand a 500-year storm. All the others were designed for a 100-year storm. Also, there are still buildings where it was difficult to construct mitigation devices, the way the land slopes

and the position of the buildings prevented full protection. They can withstand the frequent small flooding events, but not a 100-year storm.

Organizational Memory

Organizational memory presents an experiential aspect of previous disasters that Offers solutions for current and future flooding events. Without an organizational memory, the organization lacks the history and knowledge of previous floods. It will have to relearn the experience, including all the aspects of the disaster, thus reproducing past errors and re-discovering solutions that should not have to be re-discovered. For example, the University was unaware that it did not have to follow an insurance company's "suggestions." They could use the insurance proceeds for any reason they desired. The original thinking in the Planning Team fell victim to an insurance company's dictate to bring the University back to a pre-flood condition. This was an unfortunate false assumption on the University's part, one that cost them money. An organizational memory might have saved the Planning Team both effort and time.

Three prior flooding disasters had struck the CSU campus during the twentieth century (1902, 1938, and 1951). Each succeeding flood came as a surprise and caused more damage than the prior one as the University grew in size and population (Charlie 1998). Each flood essentially followed the same path. Each flood resulted in higher costs and increases in the number of people-at-risk as the University continued to build buildings and infrastructure and hired more people to run them. Additionally, the number of students kept increasing (Goss 1997).

This growth paralleled the growth and density shifts in other locations as is seen in India, or into less desirable lands (flood plains) or earthquake zones for example. The

University remained vulnerable to flooding, because there were no effective measures or mitigations that would warn the community, ensure against losses from disaster or allow for efficient recovery. Bogard (1984) refers to "first-order mitigations" as actions taken to enhance basic possibilities for the detection of hazards [risks] (e.g. warning systems Mileti, 1980 p. 327). The floods were spaced apart in such a manner that no one at the University that I spoke to could remember the prior flood that had inundated the campus. If the administration had been aware of previous major floods to hit campus, it might have had the impetus to build and fashion mitigation devices providing some protection against flooding. But, mitigation efforts did not take place after any of the prior floods. This oversight is an example of how the lack of an organizational memory, the lack of an historical archive, and no written experiences may have directly added to the destruction.

No organized archive at the University existed at the time of the July 28th flood that contained information on prior floods. A history professor, James Hansen (1977) wrote an unofficial/official history of Colorado State University and it does not contain any references to prior flooding on campus. The only records found were newspaper accounts, and these were assembled by a CSU faculty member *during* the recovery stage of the 1997 flood (Charlie 1998, see Appendix IV).

University employees could remember prior snowstorms they had experienced because they were recent events, but they did not remember the last flood in 1951 because they were not working at the University and the last flood occurred forty-six years earlier. They did not have any experience of a disastrous flooding event. Lacking any recall of the historical information (memory) on the prior flooding events, the University gambled on the weather. That gamble was lost all four times and led to

disastrous consequences on campus and the lack of any priority placed on any mitigation efforts (Morris 1997). This mistake unfortunately allowed the University to develop a perception of risk for encountering a disaster as being at the level of low to no risk.

An example from a different type of disaster, war, shows what can happens when organizational (institutional) memory is well known but completely disregarded resulting in disastrous consequences. General William Westmoreland states,

> To maintain an American, Allied or ARVN [Army of the Republic of Vietnam] presence everywhere all the time, he [General Mathew B. Ridgeway] said would have required literally millions of men—and I still would have had to maintain a reserve to counter big unit threats.
>
> The United States had known these numbers for years, but *they had been lost in the institutional memory* [emphasis mine]. In the early 1950', General Matthew B. Ridgeway had studied the prerequisites for an American military campaign in Indochina and found them "chilling": up to a million men, enormous construction costs, and a national mobilization that he predicted might become "politically very messy." Because the land was particularly suited to guerrilla operations, Ridgeway said, "every little detachment, every individual that tries to move about the country, will have to be protected by riflemen". . . .
>
> Ridgeway's worst fears had been realized, And now the [Vietnam] war strained the United States strategic responsibilities (Pisor 1982, Pp. 237-238).

The "institutional memory" stated above was completely ignored and the consequences are historically clear and grievous. 58,177 (U.S. Department of Defense 1965-1973) United States military personnel were killed along with 223,748 (Summers 1985) South Vietnamese and 666,000 North Vietnamese and Viet Cong (Summers 1985) who paid the ultimate price. Lack of an adequate organizational memory can have catastrophic consequences whether it be in war or natural disasters.

Other Findings

Communications and Warnings

Lack of adequate communications was a major problem in all three stages; warning, emergency, and recovery. There were no warnings given out from the "weather forecasters" about a flooding threat until the afternoon of the 28th when the flood had already receded (Doesken and McKee 1998).

During the emergency stage, the electric power and telephone systems were knocked out of service and remained that way into the recovery stage. When the flood struck the University, the biggest problem the employees had to try and overcome was the lack of communication. The standard operating procedures were inadequate. They did not cover any kind of flooding, let alone a major disaster. Management – employee communication was imperative for optimal functioning. In some instances, emergent groups took charge until the formal organization was able to operate. Without communication and written procedures the University had problems functioning. Ability to communicate was an absolute necessity.

No flood warnings were given at Colorado State University. Many environmental disasters are surprising events that strike with little or no warning. The literature [5] shows the importance of what to do in the event of severe weather, provided there is ample warning given. However, often there is not enough time to communicate warnings or

[5] The Severe Weather Plans for the University in Appendix VI and VII. For warning and evacuation stages here are some examples: Clark and Short 1993; Drabek 1969; Dynes 1994; Dynes and Wenger 1971; Mileti 1975, 1980, 1997; Mileti et. al 1975, 1981, 1985, 1990: Mileti and Darlington 1990; Mileti and O'Brien 1990; Morgan et. al 2002; Moore et. al 1963; Perry 1987; Perry and Greene 1982; Quarantelli 1980, 1984, 1985; Slovic 1987, 1992, 1999, Slovic et. al 1997, Slovic and Weber 2002; Stallings 1990, 1996; Turner 1983; Turner et. al 1981, 1986.

allow evacuations. One problem with warnings is that people do not personalize or necessarily receive, or understand the warnings, if one was given. As Fitzpatrick notes,

> The research record on communication of public warnings points to the important characteristics of a warning that maximizes the probability that people will correctly think about the message and attach meaning to it, believe it, personally define the situation as relevant to them, and then engage in actions (Fitzpatrick 1992, p. 169).

Communicating warnings is of little use unless the warning is heard by those at risk, the level of their belief in risk messages, accurate public understanding as to what the warning is saying, and finally, the presumption that the public is actually hearing the warnings. A different way of communicating these risk messages is through sequential factors of

> . . . hearing the warning, attachment of meaning to what is said, believing what is heard, defining the risk as relevant to them personally, developing cognitions about what to do, and then engaging in response behavior" (Fitzpatrick 1992, p. 172).

Communication of warnings may very well be a futile effort for those that issue the warnings. If disasters strike suddenly or in a surprising manner, there is little time available to issue these warnings. This happened during the Big Thompson Canyon Flood on July 31, 1976. At Drake about halfway down the canyon the river was flowing at 137 cubic feet per second at 6:00 PM. By 9:00 PM the river was flowing at 31,200 cubic feet per second.

> The victims had little warning. The first warning came at 8:30 PM when Colorado State Patrolman Bob Miller, sent to investigate reports of rock and mud slides on the highway, radioed before escaping: "Advise them we have a flood. I'm up to my doors in water." Not enough time to evacuate the canyon (UCAR 2004).

A different problem arises when the actors may formulate a relationship to "the boy who cried wolf." Meteorologists have addressed this problem when they developed the concepts of watches and warnings to overcome desensitizing the public with repeated warnings that do not pan out. Watches offer the possibility of severe weather occurring, while warnings change the possibilities to probabilities. Warnings are used less often than watches but may cover a large area within a storm's reach. Watches are less threatening for the meteorologist to communicate. They indicate possible risks and are used to alert the public to possible problems (Nelson 1999).

Neither watches nor warnings were issued before the University flood. As the storm that caused the flood moved very slowly in a northeasterly direction away from Fort Collins and CSU warnings were then issued to those in the storm's path northeast of campus, the storm stalled. No one expected or predicted that the storm would remain stationary for any length of time. The extremely large volume of rain (see Appendix I) came as a total surprise (Doesken 1997b).

Insurance as Mitigation

Millions of dollars were lost. At the start of the recovery stage the VP knew that CSU had insurance but did not know what amount of money was available. This made planning difficult. A disagreement erupted between the State and the insurance companies. The insurance companies claimed that the flood was a normal flood where a body of water left its banks. They claimed that the five irrigation ditches west of and on CSU's campus (Arthur's Ditch) were full and they overflowed their banks. If this were the case, the insurance companies would not be liable. The University claimed that this was sheet flow and it filled the irrigation ditches then flowed right over the ditches. This

is an example of "over topping" and not an example of normal flooding. If this were the case the insurance companies would be liable. The argument went on for weeks. A letter was acquired from the major ditch company that stated the ditches were empty the day in question and the "head gates" where closed at their source (Poudre River). When rain was in the forecast, the ditch company would close the gates to take advantage of the free water they would receive when it rains thus saving water shares the ditch company owned. The University's insurance was approved. Case Closed!

CSU's administration allowed the insurance companies to take charge of the recovery operation because they assumed that the insurance companies had the experience to best deal with disasters and that they would have Colorado State University's interest at heart. This decision was a mistake, because the insurance companies were only looking out for their own interests. Different insurance companies insured different levels of dollars. Dealing with several insurance companies at the same time was very confusing. Company A would insure the first $5 million, Company B the next $2.5 million, the next $10 million and so on until the primary reinsurer was the last level of insurance. For each level the University had to deal with a different company. When that company reached the prescribed dollar exposure, they paid and left, regardless of their role in the recovery effort and any projects they had ordered. The next level insurance company could tell the University to stop work on the projects the prior level insurer ordered. This action added to the confusion at the administration level, as they did not know which company was doing what project.

After-effects

Kevin Oltjenbruns told me, "when the employees and the administration of CSU saw the flood damage they were shocked." She also added (1998) that many of their social clues, their familiar places such as where they ate lunch with friends had been destroyed including their personal space in their offices, their photographs on the wall, even where they had coffee during their breaks from work. With their offices heavily damaged, no one there to inform them on what they should or could do, or what was going to be done with their offices, they felt numbness or deadening of their senses, they were disoriented from the lack of communication. They were left wondering what was next, and they also lacked understanding of what had happened in the first place. The employees or workers especially felt that everything was out of their control and their world had turned upside down. The administrations knew they had to take charge; however they did not know what they had to do or how to do it. Initially, no one emerged to lead a recovery effort.

A new social order emerged, forcing everyone to change his or her behavior in a world vastly different than the day before. The physical damage to both state and private property was much greater than the University had ever experienced before. The employees at the University had to accept the facts facing them. A new way of operating needed to be established in order to return the organization to a state of *status quo ante* (Oltjenbruns 1998).

CHAPTER V

CONCLUSION

The primary purpose of this dissertation was to study the factors that aided or hindered Colorado State University in the attempts to stabilize and restore the community to a more normal functioning state similar to the pre-disaster state. Four factors; emergent groups, disaster subcultures, perception of risk, and organizational memory aided the University's quest for normalcy. Emergent groups responded to the recovery stage and took charge as the University tried to deal with conditions that were beyond their capabilities. Colorado State University's formal procedures worked well when everything was in the normal state. But when the flood hit everything changed. CSU was incapable of coping with the demands placed upon it using its official decision making structure. These emergent groups and workers were anxious to get started on the recovery process. Initially, they had little direction from CSU supervisors. Groups began to emerge very quickly. They began the recovery process in their own areas on campus where they would normally be working and would feel most comfortable. They were very familiar with these areas and a form of ownership arose with the groups.

There were at least five groups that emerged during the recovery stage, although two other groups did not develop fully. Two of the groups, the Doers and the Achievers were effective and efficient in the areas where they were located. The other three groups, the Seekers, the Lookers, and the Leavers added little or nothing substantial to the recovery effort. The Lookers and the Leavers

were observed, but they are not emergent groups. They are just groups of people. When the bureaucracy came back on line all five of the groups were reabsorbed into the workforce. After the recovery stage was completed and back in the administration's hands, everyone in the effected buildings was given a plaque of thanks for a job well done. This included all five of the groups mentioned above as well as other people who were not group members and did not take part in the recovery effort. CSU's administration did not realize just how important emergent groups were in effectively coping with the flood.

The University had no adequate disaster plan or planned modification in their structure to deal with a major flood. Fischer (1998) offered standard operating procedures that prove effective in an organizational response to a disaster. They include:

1. Prior disaster experience.
2. A clear authority structure.
3. Accurate information gathering and dissemination.
4. A functioning emergency operations center.
5. An appropriate procurement and distribution system of human and material resources.
6. Proper task delegation and coordination.
7. Coordinated information flow with the mass media.
8. Coordination with outside organizations (private, state, national).
9. All response activities are based on real needs.

The most important findings in this dissertation were the following:

1. *Communications*. The lack of effective communication results in conjecture and confusion. Rumors were rampant, and misinformation presented a confusion that was not easily overcome. Contrary orders were given, often based on rumors. Communications are the most important aspect of the recovery stage and must be established as soon as possible. It is a necessity that the messages be clear and precise. The disaster literature puts communications as a very high priority.

2. *Planning*. Pre-planning is essential, if a plan is not available set up a Planning Team as soon as possible. Plans for operations and recovery have priority. These plans need to exist and be exhibited or displayed in order for everyone to see them. This process is another form of communication.

3. *Leadership*. Strong leadership must be communicative and must take charge immediately. Teams must be established to put the plans of operation and plans for recovery into action.

A tremendous amount of disaster information was available to the University on the web. The problem is that someone needs to sort it out and make it into part of an organizational memory in order for the information to be useful for future planning and future procedures. A unit of the Engineering College, The Water Center, took it upon themselves to be the depository of any photographs of the flood. There is also a collection of newspaper articles and videotapes being held in the Public Relations office. The Library has a newspaper archive. The Computer Center has all the back-up tapes. The Business and Financial Services maintain the financial records of the costs and payments for the flood. Finally,

each department has their own stories about the Flood of 1997. Unfortunately, there is not one organized source or archive of material.

Archives and Organizational Memories

Ackerman (2003, p. 1) discusses the importance of filing and retaining organizational memory. In the present study we saw the lack of it impeded a quick, well planned response to the flood. Future researchers could examine the collected organizational paper data generated during the July 28, 1997 flood disaster. The researchers could collect oral histories, stories, and anecdotes to add the social aspect and robustness to the reams of paper and the miles of computer back-up tapes on the flood. Additionally, the establishment of a single archive would enhance the experience for future research. As we have seen, many factors are necessary to form an organizational memory including newspaper articles, computer information, story-telling, and personal anecdotes and other memories. Memories of individuals are especially important to collect as soon as possible as memories fade over time. Additionally, the establishment of a single archive would enhance the experience for future research. Further, what still needs to be settled in the theoretical realm is whether information is stored and processed by individuals who comprise the organization, by the organization itself, or by the dominant coalition or an upper echelon as a reflection of the organization's hierarchy as Walsh and Ungson asked in 1991.

Perception of Risk

Whether it is the rushing water or the building on a flood plain that defines the risk is an impossible question. It remains the participant's definition of the

situation that develops the perception of the risks associated to these kinds of events.

Some questions that may be examined include: Are organizational perceptions of risks a consensus decision or are the decisions political in nature? Who is involved in deciding an organization's risk?

This study relied on emergent actions or inactions to determine risk perceptions. What happens when development on a flood plain is the acceptance of a known flood risk and the risk is not passed on to the occupants? People buying property in a known floodplain are required by law to have flood insurance. They know they are encountering and accepting a risk. But, what about the people leasing or renting in these same areas are they informed? What about the students at the University? Are they informed that they will be living and going to school in an area subjected to flooding and infrequent disasters?

Communication

More work on communication, especially in the recovery stage of a disaster is essential. The bureaucracy initially loses its effectiveness in times of disasters. One of the first things to stop working is the communication network. With telephones out and the electrical system out (can not charge radio batteries) development of a line of communication to both the horizontal and the vertical planes of management is very important to get the organization back in control. How to get the message out, how to develop a way for people to hear the message, and how to develop a direct line of communications are paramount for

effective sharing of information and helps develop the leadership roles during the disaster stages.

Emergent Groups

The process of de-bureaucratization and emergence of new groups followed the pattern found in the previous literature on disasters, bringing the focus closer to home. Several questions emerge: Will emergent groups that were reabsorbed after the recovery stage become active in the next flood? What happens to emergent groups when an organization has an active memory?

Emergent groups in this effort were studied only during the recovery stage, are they apparent in other stages such as in the warning and evacuation stages? From newspapers we hear of individuals risking their lives during the emergency stage of a disaster. These altruistic actions do not constitute emergent groups. They are, however, emergent roles. What different roles could be incorporated into emergent groups?

Does the emergent group phenomena take place in all disasters? Or, are they limited to disasters where no organizational memory exists? Further research on disaster - emergent groups from different disasters would answer these questions.

Do metropolitan areas; with experience in different types of disasters have a better absorption capability for disasters? Do groups emerge in areas that have disaster subcultures?

Mitigation Efforts

After the 1997 flood CSU installed multiple mitigation devices. For example: a wall was constructed to protect the library and berms were built to divert the water from the student center and bookstore. More devices were needed but the administration and FEMA decided that the remaining structures could not be effectively protected and would have to stand-alone. The probability is high that the community will be hit by another flood in the future. Researches should study the effectiveness of the mitigation devices and then look at how the devices changed the natural waterways. The water would be funneled or directed off campus into residential areas. The social responsibility of the University could become an issue. For example, in a reverse situation, development in the city west of campus diverted 40 percent more floodwater into the campus then it would have if the west side stayed in farm land. Is Fort Collins socially and physically responsible for diverting floodwaters into the campus?

Examination of the possible effects other mitigation devices such as city planning, disaster planning, building requirements, warning and evacuation plans and more city/university joint water resources planning, which would have had an impact on the July 28th flood should be considered.

Disaster Subculture

Why do disaster subcultures perform much better before and after natural disasters? The literature is clear. Disasters place qualitatively different and quantitatively increased demands on communities and organizations. There just is not sufficient time for them plan once impact is imminent.

Communities with disaster subcultures have learned from previous experiences and have incorporated this knowledge into their disaster plans (i.e. planned modifications in their structure). But how do Fort Collins and Colorado State University incorporate elements of a disaster subculture into their emergency structure and procedures? Future research should be directed at communities and organizations that have been successful in their attempts to cope with natural disasters, especially floods. Furthermore, these efforts should focus not only on the warning and emergency stages, but also the recovery stage.

Strengths and Weaknesses

A major strength of a qualitative field study is the richness of the data and the ability to gather data over time -- like the anthropologist living with a remote tribe over a long period of time. Data was gathered from a wide variety of sources on a large number of variables. The data were gleaned from observation, interviews, high-level meetings, and secondary evidence. The internal validity of the study was very high.

A second strength in this effort was the accessibility made available at every stage of the disaster along with access to many people involved with the recovery process. These included the main contractors, the sub-contractors, CSU's administrative personnel, deans, directors, managers, and supervisors of the impacted areas. Additionally, a pathway was maintained for communications with the administration of the surrounding city and other agencies.

Another strength involved the current researcher knowing all of the key participants in the University's administration. Relationships with the participants

were reinforced allowing the interaction with the participants and the ability to judge and crosscheck the observations to better guarantee the validity of the data.

A primary strength may also have been a major weakness. One of the weaknesses of a qualitative case study lies in the difficulty of generalizing to a larger population. Because CSU's response could have been unique and represents an *n* of one, its external validity could be quite low.

Another potential weakness had to do with my role of participant observer. I had to play two roles at the same time, that of researcher and as an administrator. Was the role as an administrator aiding the recovery effort in conflict with the objectivity required of a researcher? I tried not to go "native." Second, as a project manager, I was expected to impact the recovery stage. Did the researcher wind up studying the researcher's behavior? In other words did I study myself? Was the "Hawthorne Effect" operative? I believe CSU would have functioned in a very similar manner with or without my role as participant observer as it would have if I had been a non-participant observer. Third, did the respondents behave and respond to me differently because they knew I was undertaking research? I don't think so, because I checked and crosschecked information rather than relying on single sources. And, besides, I don't believe my presence influenced anyone. People were too involved in the recovery effort to worry about me.

Closing Thoughts

This study was limited to the recovery stage of the July 28, 1997 disaster at Colorado State University. Studying other stages, like warning and emergency,

would be very useful in studying emergence and disaster subcultures. Future disaster research should be directed at the following areas: Archives and Organizational Memories should be consolidated and be readily available to communities and organizational decision makers. These efforts may prevent the same errors from being repeated in the next disaster.

We are living in perilous times with threats of war, terrorism, and natural and human-made disasters. Communities cannot possibly prepare for every possibility. Therefore, they must decide what level of risk they are willing to take or assume. It is within these areas that communities should focus on well-developed disaster plans.

A perception of risk at the individual's level is an ever-changing construction (see Table 1 on page 33). An organization's perception of risk is also capable of changing over time. In this study the organization had two sectors of the University with differing perceptions of risk. After the disaster each had more data about threats or hazards to the university then they had before it occurred. Has the university's perception of risk changed? Are the two sectors now equally aware of future risks? When dealing with future disasters a consensus of a perception of risk must come into any organizational planning process. Are successful disaster subcultures successful because they have strong charismatic leaders or superior disaster plans or both?

Adequate communications are a must for the recovery stage. Knowing what the plans are, knowing who will do what, knowing who is in charge, and knowing there are goals avoids tremendous amounts of confusion, repeated

operations, employee morale problems, and impacts team efforts in a negative way. Disaster workers must have clear and unimpeded communication both horizontally and vertically to be effective. The standard operating procedures could include this information and would be available on the University's home page on the World Wide Web.

When groups of employees emerge into work groups they maintain some sense of organization. Emergent groups often fill in gaps of a not fully functional bureaucracy. These groups do accomplish considerable amounts of goal-oriented work if provided with the necessary resources and adequate direction. As the group emerges, communications are confusing at best. This is one of the reasons they emerge. Another is there is the perception of work to be done. Third, the groups are not always altruistic. They perceive their home office territory and want to preserve and protect it. Finally, after these groups have completed their emergency and recovery tasks they are normally reabsorbed into the pre-disaster bureaucratic structure.

Mitigation efforts are directly proportional to the degree of risk that is accurately perceived. If the risk is high, mitigation devices are needed to minimize the risk. Constrained, usually by either lack of organizational memory or budget concerns, mitigation will receive very low priority. Organizational memory must be kept current to assure the most effective community response to the next disaster. Communities and organizations will respond most effectively to the next natural disaster, in the case of Fort Collins and Colorado State University the next major flood, if they build disaster plans into their existing

structure. During the present flood they relied primarily on emergent groups to face daunting demands. They would have anticipated the nature and size of the demands they might face. A pre-planned modified bureaucratic structure could have reacted faster and with greater effectiveness.

Disasters are always going to exist whenever humans and nature occupy the same place. It appears that population growth and density, along with the development of marginal land and building in disaster prone areas are here to stay. If current practices continue, the human cost of disasters will continue to escalate. It is like a highway: when an additional lane is added, supposedly to reduce congestion, the new lane is instantly as congested as all the old lanes. Disasters are like that and continue to be.

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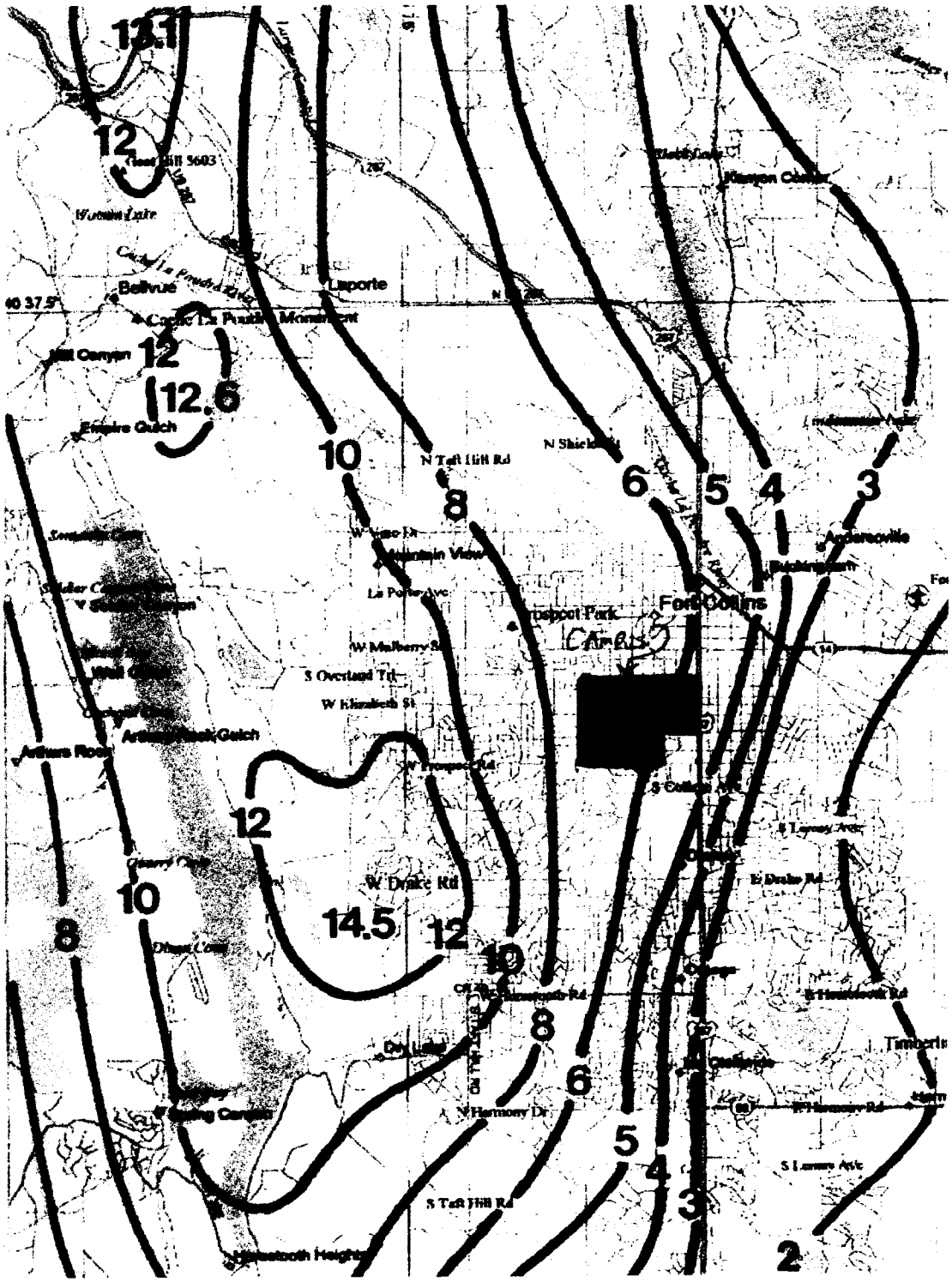


Rainfall Totals 7/28/97 Source: Doesken 1997

Appendix I

Appendix II

General Questionnaire for Interviews

The people interviewed for this dissertation were management, department managers, and supervisors. These people were "in the know" of what was going on and who was responsible for the task accomplishments. The people either worked for Fort Collins or at Colorado State University. In some cases, the person holding one of these positions could not perform under intense pressure and was removed and replaced. Their replacement was interviewed.

The interviews were conducted over several weeks. The initial questions were open-ended designed to search for key words (workers, direction, groups, memory, risk, hazards, and the like) and core concepts (Emergent Groups, Disaster Subcultures, Perception of risk, and Organizational Memory). A final question was an open-ended question that often revealed the most important information. One interview was conducted twice. In some cases the interviews were done twice.

All interviews were face-to-face except for the one for the VP. The interview with the VP was done covertly over several months. Additionally, I made use of the interview the VP gave to the Colorado State University Alumni Magazine (See Appendix III). The questions were asked conversationally i.e. are you still working for X?

Additionally, because I was on a first name basis and I worked for 15 years with almost all the key participants, I had many casual conversations with each of them. These conversations gave me many insights for my core categories and insight to the

organization and how the organization responded outside of the normal bureaucratic structure.

Questions Asked:

1. What position do you hold? (Job reference).
2. What are your direct responsibilities for the flood? (Job reference).
3. Who is your supervisor or who gave you orders or directions to follow?
4. What is your impression about the attitudes of your people (subordinates)?
5. How are you holding up?
6. How do you feel about the University's initial response?
7. What did your employees do? What roles did they take if any?
8. How well do you feel you were receiving communications from management?
9. Did you know that there were prior flooding disasters at CSU (or Fort Collins)?
10. Was your home in any flooding?
11. What was your first impression when you came to campus (or Fort Collins)?
12. What else?

Appendix III Interview With VP Bomotti

Interview with the Vice-president of in charge of the flood recovery, by Kathy Hayes and Mark Minor. 1997. "The Flood." Alumni, The Magazine for Alumni and Friends. Pp. 6-8. The City, CO: Western University.

VP – Sometime before midnight on the 27th -- " 'It's not that I don't believe you, [Chief of WU Police] but I've got to come and look at this myself.'

"The VP drove north on College Avenue, but police barricades near Montgomery Ward forced him to turn east. 'You could see there was a massive amount of water over the road down there,' he says. He managed to get to Pitkin Street, and tried entering the campus there, but the train had derailed, blocking the intersection. He backed up and drove to the South College Gym but found there was too much water there to cross. Eventually, he found his way to West Mulberry Street and to the [West] Laurel Street entrance near the Oval. With the streetlights and power out all over campus, he cautiously crossed Laurel and parked his car near the entrance to the Oval. He stepped out and looked to the Oval; a person in a rowboat paddled across what, earlier in the day, had been a grassy lawn.

"Driving west on Laurel and then south on Shields, the VP sat in his car and watched the river that was running from West Elizabeth Street onto campus. Several cars floated by. Near the football practice field, he could see a gaping hole in the pavement. Backtracking, he went back up West Laurel and turned onto

Meridian Avenue. Outside the student center News 4 was doing a live broadcast, shooting footage of water gushing into the building. He drove further east and parked near Spruce Hall, then walked down Mason Street, where he heard a thunderous noise. The pedestrian tunnel that runs under the railroad tracks behind Johnson Hall had turned into 'a hydroelectric spillway,' he recalls. 'It was dark, but the water was boiling enough that you could see a white cloud of water flying through the tunnel.'

Unable to get to his office in the Administration Building, The VP left campus and went home. 'I had enough information to feel that the campus wasn't going to operate as normal the following day.'"

Appendix IV

A Sampling of the Only Known Historical Flooding Archive (Charlie 1998).

The Daily News. 1902. Monday September 22, 1902. "Cleanup from Storm" Denver, Colorado.

The Denver Post. 1902. Sunday September 21, 1902, "Worst September Storm in 31 Years." Denver, Colorado.

The Evening Courier. 1902. Monday September 22, 1902. "Last Saturday's Storm a Record Breaker." Vol. 1:151. Fort Collins, Colorado.

Rocky Mountain Collegian. 1902. Monday October 6, 1902. "Society Notes, The Columbian Literary Society." Vol12: 1. Colorado A&M. Fort Collins, Colorado.

Fort Collins Express-Courier. 1938a. Sunday Morning September 4, 1938. "College, Farm Areas, Bellvue, Hatchery Hit Hardest in Storm." Page 1. Fort Collins, Colorado.

Fort Collins Express-Courier. 1938b. Monday Evening, September 5, 1938. "All Roads Here Opened Today. Workers Clearing Debris From College Buildings; Streams Recede." Page 1. Fort Collins, Colorado

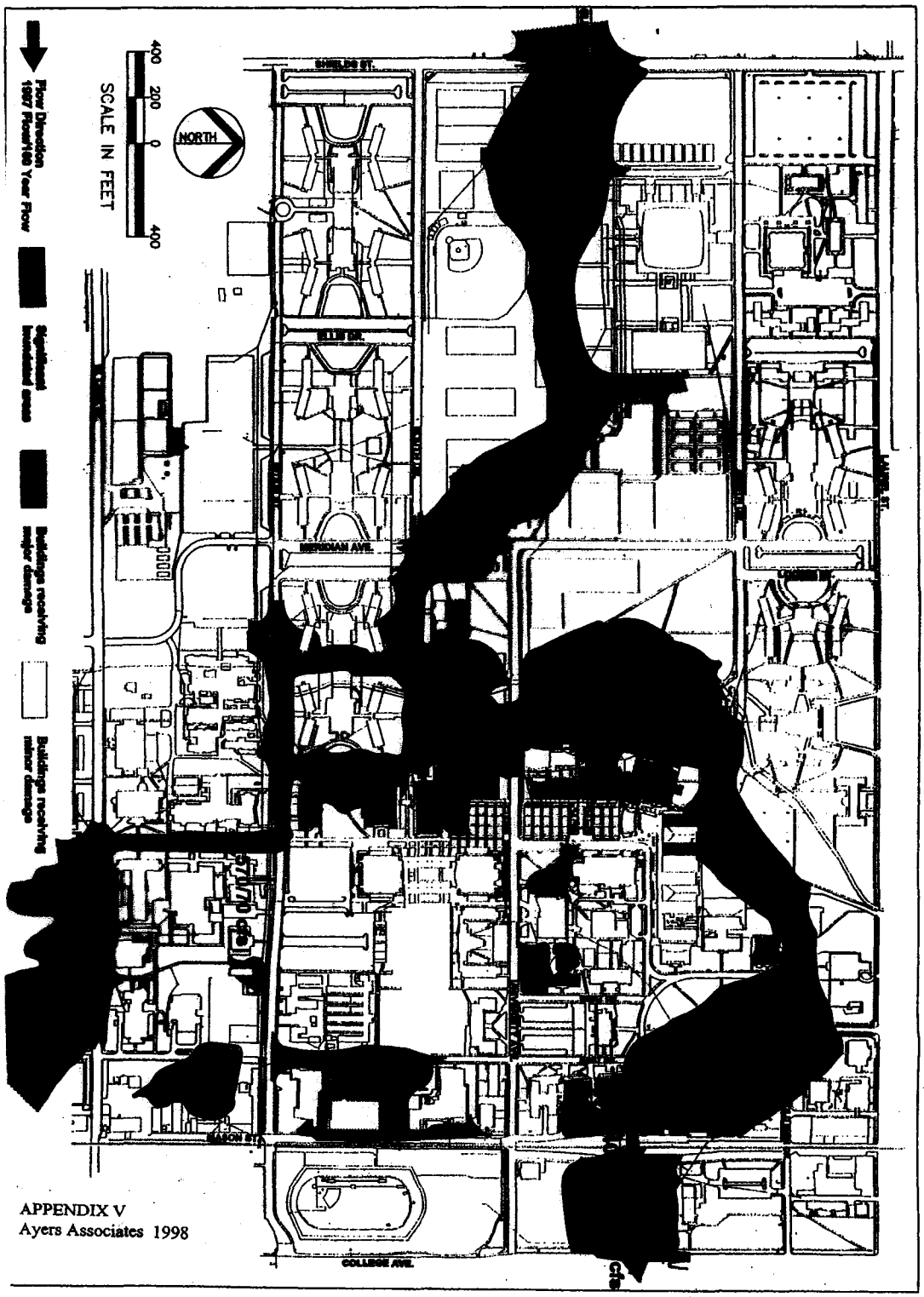
Fort Collins Express-Courier. 1938c. Thursday Evening, September 8, 1938. "Value of Ditch Cover Shown by Recent Flood." Page 10. Fort Collins, Colorado.

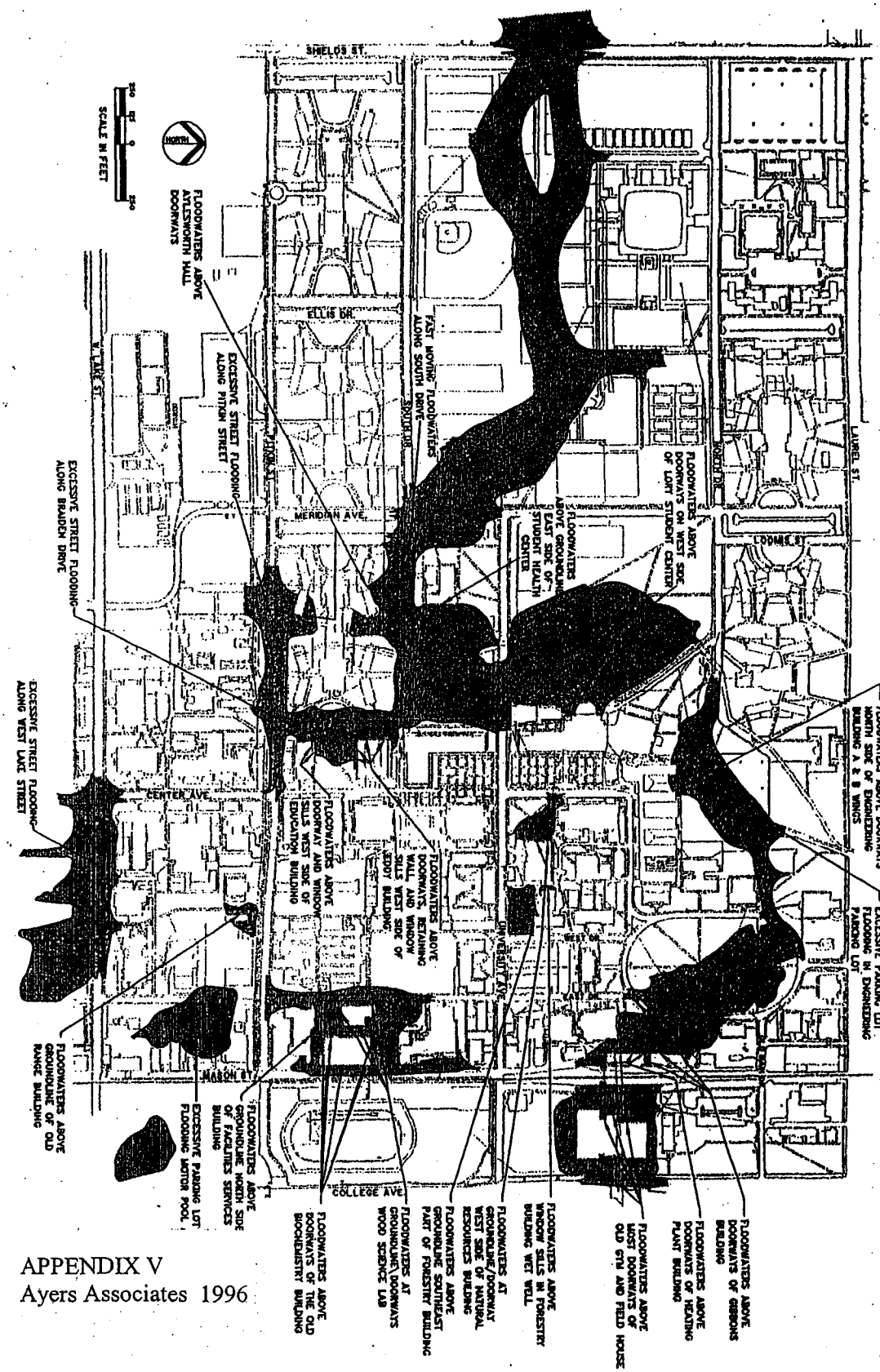
Rocky Mountain Collegian. 1938. Friday, September 9, 1938. "Worst Flood in History of College Stops Power Service and Inundates Buildings on Colorado State Campus." Vol. 48:p1. Colorado A&M. Fort Collins, Colorado.

Fort Collins Coloradoan. 1951a. Sunday August 5, 1951. "College Disaster Recalls Similar Flood of 1938." Page 1. Fort Collins, Colorado.

Fort Collins Coloradoan. 1951b. Sunday August 5, 1951. "Twin Floods Started in Small Area, Survey Shows; Overflow of Ditches Inundates Campus." P. 2. Fort Collins, Colorado.

Fort Collins Coloradoan. 1951c. Sunday August 5, 1951. "College Counts Flood Loss at $270,000; Classes Slated." Page 4. Fort Collins, Colorado.





APPENDIX V
Ayers Associates 1996

Appendix VI

Colorado State University

Snow and Severe Weather Policy (Revised September 30, 1996)

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Appendix VII

Colorado State University
Emergency and Severe Weather Notification
Policy and Procedures
2003

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