RECENT DISASTERS IN CALIFORNIA

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ABSTRACT

California has had numerous natural disasters in recent years. Some of the earthquakes and fires will be reviewed to see what advances have been made in preparedness, response, recovery and mitigation by federal, state and local authorities and voluntary organizations.

INTRODUCTION

The State of California is famous for a variety of reasons. Hollywood and Disneyland are located in California. The state's agricultural counties produce tremendous quantities each year of lettuce, broccoli, artichokes, garlic, and other vegetables. During World War II, California's aircraft factories made thousands of military airplanes. The state also seems to have more natural disasters than most of the other states. When it comes to earthquakes and urban/wildland fires, California has had more than any other state. Fortunately, hurricanes hardly ever happen in California.

CALIFORNIA

California is on the West Coast of the United States with an area of 158,706 square miles and population of about 30 million. By comparison, Texas, with an area of 266,000 square miles is much larger than California, but with about 18 million population has only about half as many people. Alaskans are quick to point out that Alaska is BIG with an area of 591,000 square miles, even though the population is only 586,872 people.

CALIFORNIA DISASTERS

Disasters in California which will be discussed include the following:

Earthquake

Northridge (Los Angeles)	Jan 17, 1994
Loma Prieta (Santa Cruz)	Oct 17, 1989

Fire

Southern California	October, 1993
Oakland/Berkeley	October, 1991

Civil Unrest

Los Angeles June, 1992

Appendix A California Earthquakes and Fires lists some of the major events of the past ten years.

EARTHQUAKES

The most recent big disaster in California was the earthquake in the Los Angeles area in January 1994. Table 1 presents some highlights of the Northridge (Los Angeles) earthquake which happened at 4:31 A.M. on January 17, 1994.

Table 1 Northridge (Los Angeles) Earthquake

Killed	57
Hospitalized	1,566
Injured	9,158
Houses Destroyed	2,000
Apartments Damaged	32,000
Trailers Damaged	6,000
Property Damage	$20 Billion

Notes:

25,000 people in Red Cross & Salvation Army shelters
Damage to Santa Monica Freeway
Damage to Interstate Route 5
600,000 Requests for assistance to FEMA, State, County, & Cities

The earthquake was initially classified as 6.6 on the Richter scale which was later corrected to 6.8. The damage was inflicted over a wide area in Los Angeles and Ventura counties. It is interesting that an earthquake in 1971 at Sylmar damaged a highway overpass structure which was damaged again in the 1994 earthquake. It was fortunate that so few people were killed considering that so many people were injured and so many apartments, houses, and trailers were damaged.

The electrical power system failed at 4:31 A.M. on Monday, which caused problems for many residents for the first week after the earthquake. For example, power to some 95 percent of the city's 2.3 million customers

was restored by the end of the week. However, the unlucky 5% continued to have problems for some time. There were power disruptions from minutes to 3 hours in Idaho, Montana, Wyoming, Oregon, and Washington. In addition there were power disruptions in British Columbia and Alberta in Canada, as well as the problem resulting at some aluminum smelters in Oregon which lost power from Los Angeles at the time of the earthquake.

The American Red Cross quickly established about 40 shelters to house the earthquake victims. However, initially only about 5000 people registered to stay at the Red Cross shelters which were mostly school buildings. It was estimated that 20, 000 people, mostly Mexican,were sleeping in public parks and in parking lots in makeshift shelters or tents.

Many of these people apparently had relatives or friends in Mexico City where 9000 people were killed in an earthquake and they were afraid to go inside any building, be it a Red Cross shelter or their own apartment. A special outreach program was eventually developed to help these frightened people. After a city building inspector had inspected their apartment or house, a team of a city social worker, the building inspector and a representative from the Mexican consulate would personally transport the victim and his or her family back to their apartment and try to persuade them that it was now safe for occupancy.

The damage to the Los Angeles freeway system caused tremendous problems. It was estimated that more than 300,000 cars a day used the Santa Monica freeway before the earthquake. The city's highway department acted quickly to let contracts to begin work the very afternoon of the earthquake day to begin to remove rubble and demolish the damaged part of the freeway. A special bonus was offered to the contractor to finish the repair and replacement of damage early.

The damage to the freeways and the principal north-south interstate highway caused big traffic jams the first few days after the quake as people tried to use the alternate routes suggested by the transportation authorities. The rapid transit system under construction in the Los Angeles area had numerous riders trying out this new-to-them system.

For comparative purposes, let us examine the facts presented in Table 2 which summarizes some highlights of the Loma Prieta (Santa Cruz) earthquake which happened four years earlier at 5:04 P.M. on October 19, 1989.

Table 2. Loma Prieta (Santa Cruz) Earthquake

Killed	63
Injured	3,757
Homes Destroyed	1,018
Homes Damaged	23,408
Businesses Damaged	3,530
Property Damage	$5.9 Billion

Notes:

- Half of the buildings in the business districts of Santa Cruz and Watsonville collapsed
- Fire in the Marina District of San Francisco
- One span of Bay Bridge to Oakland fell
- One mile of the upper deck of the Oakland freeway collapsed crushing 42 automobiles
- Problems with Spanish-speaking rural population

Santa Cruz and Watsonville had numerous houses and apartments damaged in addition to the extensive damage to the buildings in their business districts.. In Santa Cruz, many business people felt that the Police Department did not understand their problems and unnecessarily restricted their access to their stores. The rebuilding of the business district took years and many businesses went bankrupt.

In San Francisco there was a spectacular fire which consumed blocks of expensive houses and apartments on the waterfront near the St. Francis Yacht Club. One span of the bridge across the bay to Oakland fell, although there was no damage to the Golden Gate bridge at the entrance to San Francisco Bay. Even though the epicenter of the earthquake was near Santa Cruz about 75 miles away, the upper deck of the freeway in Oakland collapsed and crushed cars.

There were numerous problems in Spanish-speaking rural locations in Santa Cruz county because of cultural differences. According to the latest census, about 60 % of the residents of Watsonville don't speak English. The American Red Cross established shelters in school buildings, National Guard armories and other buildings in accordance with their usual practice.. Farm workers from Mexico remembered the thousands of residents of Mexico City killed in a big quake and refused to go inside any building.

The Red Cross initially refused to help anyone living in a tent, would not feed them, and would not send a nurse to see if there were any medical problems.

The United Farm Workers organized protest rallies and staged protest marches down the remains of the main street of Watsonville. The American Civil Liberties Union filed a lawsuit against the City, State, and FEMA alleging discrimination against Hispanic people. FEMA had only a few employees who spoke Spanish, few interpreters, and no literature or forms printed in Spanish or other languages. There were pockets of Vietnamese, Laotian, Cambodian, H'Mong, and Filipino people who did not speak English in various parts of the earthquake affected area.

FIRES

Table 3 presents a few facts about the recent firestorm in six counties in Southern California which took place only a few months before the Los Angeles earthquake.

Table 3 Southern California Firestorm
October 26 To November 7,1993

County	Acres	Structures Destroyed
Los Angeles	24,600	449
Orange	15,354	374
Riverside	57,308	137
San Bernardino	4,730	6
San Diego	23,086	45
Ventura	68,176	67
totals	193,254	1,078

Deaths	4
Injuries	162
Fire Personnel	15,000
Fire Engines	905
Air Tankers	42
Helicopters	18

It is believed that about 10 of the 21 fires in this firestorm were deliberately started by arsonists.

The State Fire Marshall organized mutual aid from all over the state to bring firefighters, fire engines and fire fighting air tanker aircraft and helicopters to Southern California. The California Department of Forestry and Fire Protection used the incident command system to coordinate fire suppression operations. There were few deaths because evacuations of residents were carefully planned and executed. The firefighters were largely effective in their attempts to keep the wildland fires out of urban areas, although more than a thousand homes were lost.

By contrast, Table 4 shows the highlights of a California fire where City firefighters were not prepared for an urban/wildland fire.

Table 4. Oakland/Berkeley Fire
October 20-23, 1991

Deaths	25
Injuries	150
Houses Destroyed	3,354
Apartments Destroyed	456
Acres Burned	1,600
Fire Engines	305

Problems - Oakland/Berkeley Fire

Fire ignited 790 homes in first hour
Hilly urban/wildland interface
Evacuation
Narrow streets/abandoned automobiles
Incident Command System
Mutual Aid System
Communications
Water pressure/hydrants
Untreated wood roofs
Weed and brush abatement

More than three thousand homes, many of them expensive, were completely destroyed in a few hours in this fire.

There were a number of contributing factors to this poor performance, according to the official "lessons-learned" reports. The weather made firefighting almost impossible with temperature of 92 degree Fahrenheit, relative humidity of 16 percent, and winds of 30 knots gusting to 50 knots. The streets were narrow and clogged with burned-out hulks of a thousand automobiles. The water supply for firefighting came from hilltop reservoirs which were soon emptied. The poles carrying electrical wires up the hills to the pumps burned so that there was no electricity to pump more water into the reservoirs.

The Oakland Fire Department had a different size hydrant from all other California cities so that mutual aid engines from other cities needed an adapter which was in short supply. The Oakland Fire Department's budget had been cut so much in the preceeding ten years that about 40 % of the personnel had been retired without replacement. With little money for modernization, the fire engines had antiquated two-channel radios for communication instead of more modern sixteen-channel radios. This made it difficult to communicate with the three hundred mutual aid fire engines.

CIVIL DISORDER

Table 5 presents a few facts about the worst race riot in the United States in recent history which took place after the result of the trial of police officers in the Rodney King case was announced..

Table 5. Los Angeles Civil Disorder June, 1992

Killed	62
Injured	578
Arson fires	5137

Law Enforcement forces in the Los Angeles riot

Los Angeles Police	4,568
Los Angeles Sheriff	1,465
Highway Patrol	1,378
Federal Agents	1,567
National Guard	12,456
U.S.Army & Marines	2,345
total	24,564

It is interesting to note that some of the fire departments which had been requested to provide fire engines and firefighting personnel under mutual aid agreements felt compelled to decline because they did not have bullet-proof vests for the firefighters to wear under their turnout gear. Police or Army troops had to accompany each fire engine to protect the firefighters from snipers.

CALIFORNIA EMERGENCY MANAGEMENT

The State of California used to have a civil defense organization. This is now the Office of Emergency Services, and its Director reports to the Governor. The Office of Emergency Services has three regional offices: Southern Region, Coastal Region, and Inland Region. One of the functions of the Governor's Office is to coordinate statewide mutual aid for firefighting and law enforcement.

An organizational concept called "Incident Command System" was developed about 20 years ago after some disastrous fires in Southern California. This concept uses standardized terminology to eliminate confusion, and a standardized organization which can expand to accomodate tremendous mutual aid augmentation of personnel and equipment. Each "incident" has one Incident Commander who has a staff of Public Information Officer, Safety Officer, and Liaison Officer. There are four Section Chiefs for Operations, Planning, Logistics, and Finance. All mutual aid forces who have been trained in this concept know how to communicate, how to report to staging areas, how to be given assignments, and how to fit into the system.

FEDERAL EMERGENCY MANAGEMENT AGENCY

The former civil defence organization in Washington is now the Federal Emergency Management Agency. President Clinton appointed James Lee Witt, his emergency management director for the state of Arkansas, to be the director of FEMA. In October 1993, Mr. Witt reorganized FEMA to de-emphasize civil defense and to recognize the threat of natural disasters, such as hurricanes, floods, earthquakes, tornadoes, etc. The new FEMA has four directorates: mitigation; preparedness, training, and exercises; response and recovery; and operations support. FEMA's budget provides for assistance to each state for emergency preparedness. The State of California, for example, divides up the grant among the Governor's Office of Emergency Services, and the counties and cities which wish to participate

in this program. Each city must provide funds to match the FEMA grant which provides funds for half of the salary expenses of emergency management personnel.

RESPONSE

After the 4:31 A.M. January 17, 1994 Northridge earthquake, the emergency response organizations of Los Angeles Fire, Police, Public Works departments, etc had their hands full. There was no electrical power, numerous gas lines broken, major water mains broken, sewer pipes broken, the Santa Monica freeway with a major collapse, and many other highways with cracks or unsafe. The principal north-south interstate highway had a collapsed section which may take months to rebuild.

The Los Angeles Fire Department had a computerized dispatching system. A backup power generator was available on standby for any unlikely failure of the commercial power. When power failed because of the earthquake, the backup generator could not be started. A secondary backup generator for the backup was then brought on line. However, after an hour's operation, it failed because of overload conditions. The Fire Department was then reduced to paper and pencil operations instead of computerized dispatching. It is apparently difficult to reconstruct what happened that day, but there may have been as many as 100 simultaneous fires. Trailer parks had many fires, because more than half of the trailers in some parks were jolted off their supports which broke the gas pipes.

The mutual aid system brought many firefighters and police to help respond to the quake. Specialized urban search & rescue teams were flown in to help rescue people trapped by collapse of buildings and parking garages. Emergency medical teams with portable hospitals arrived, since a number of hospitals in the area not only could not provide medical attention for the thousands of injured residents, but had to have their own patients evacuated elsewhere because of damage to their buildings.

The American Red Cross established shelters, mostly in public schools, and the Salvation Army ran the tent cities in public parks after the Army provided tents. Since several cities had no water for several weeks, the Army and the U.S. Marines developed a water distribution system.

RECOVERY

The Federal Emergency Management Agency and the State Office of Emergency Services activated a Disaster Field Office in Pasadena to coordinate recovery operations. Disaster Application Centers were set up in each of the heavily damaged areas. Eventually there were about thirteen of these centers plus five mobile centers which were sent to smaller pockets of earthquake damage. Victims of the earthquake had to go in person to the nearest Disaster Application Center to fill out application forms for a wide variety of Federal, State, County, and City grants, low-interest loans and other forms of assistance

There were a number of Federal disaster assistance programs as shown in Table 6

Table 6. Federal Assistance Programs

1. Home Loans
2. Business Loans
3. Temporary Housing Assistance
4. Social Security
5. Veterans Benefits
6. Internal Revenue Service

The State assistance programs are listed in Table 7.

Table 7. STATE ASSISTANCE PROGRAMS

1. Grants to individuals & families
2. Unemployment
3. Disability
4. Franchise Tax Board
5. Veterans affairs
6. Contractor's licensing
7. Insurance information

County, City, & Local Services programs were as shown in Table 8.

Table 8 County, City, & Local Services programs

1. tax assessor
2. food stamps
3. legal aid services
4. mental health crisis counseling

5. social services
6. building inspector
7. planning/permits/zoning
8. electric utility
9. gas utility
10. telephone
11. water
12. American Red Cross
13. Salvation Army

The number of people applying for disaster assistance has generally risen over the past few years. Figure 9. gives some information for these comparisons.

TABLE 9. REQUESTS FOR ASSISTANCE

1989 Loma Prieta Earthquake	86,247
1992 Hurricane Andrew	220,372
1993 Midwest Floods	166,998
1994 Northridge Earthquake	497,626

The mechanics of dealing with large numbers of applications for assistance, particularly when the numbers get up into the hundreds of thousands, are mind boggling. However, it must be frustrating for the victims to find that there are delays in processing their applications because FEMA had to hire hundreds of temporary personnel and then give them a quick course in data processing. Table 10 shows the numbers of checks actually in the mail about two months after the January 17 Northridge earthquake.

TABLE 10 NORTHRIDGE DISASTER ASSISTANCE LOANS (MARCH 31, 1994)

	HOME	BUSINESS
Applications	294,307	117,963
Returned	116,985	31,266
Decision	39,178	2,561
Approved	23,724	1,319
Checks	4,215	238

CONCLUSION - HOW ARE WE DOING?

If an alien visitor from Mars were visiting here, how would he or she grade the performance after a disaster of us American Earthlings? Perhaps he or she would notice that we are improving. Look at a disaster which happened only two years ago - Hurricane Andrew in Florida which made its landfall south of Miami in Dade County at 2:00 A.M. on August 24, 1992. Table 11 gives some of the highlights of this hurricane.

TABLE 11. HURRICANE ANDREW

Wind Speed (Estimated)	170 Mph
Dade County Population	1,986,000
People Evacuated	630,000
Dead	40
Devastated Area	625 Square Miles
Homes Destroyed/Damaged	90,000
People Left Homeless	250,000
People Left Jobless	86,000
Debris to be removed	21 Million Cubic Yards

No Electrical Power For 1.4 Million People
Only 77 Traffic Lights Of 2,600 survived the Hurricane

Problems In Hurricane Andrew

Command & Control confusion
Inadequate Damage Assessment
30,000 Military arrived late
Too much unexpected Mutual Aid
Unexpected donations caused problems
Lack of emergency power generators
Lack of emergency water and food
No fire engines operated in winds greater than 70 mph
No wind measurements. (National Hurricane Center radar, computer, & satellite communications failed at height of storm.

First, it should be pointed out that many things were done right in this hurricane, such as the mass evacuation. The death toll was low considering the severity of the hurricane. However, there were numerous problems, which resulted in Congressional hearings as to whether or not the Federal Emergency Management Agency should be abolished. In these hearings, some advocated that FEMA's responsibilities should be turned over to the

U.S.Army which had demonstrated its ability to respond quickly with water, food, tents, medical teams, transportation, emergency communications, etc. Congress is still studying this question.

However, there is now a new President and a new Director of FEMA who has already completely re-organized FEMA to increase emphasis on natural disasters. The lessons learned the hard way in Hurricane Andrew have resulted in greatly improved performance of emergency management organizations all over the United States.

APPENDIX A CALIFORNIA EARTHQUAKES AND FIRES

TABLE A-1 CALIFORNIA EARTHQUAKES

Location	Year	Size (Richter)	Dead	Injured
Los Angeles	94	6.8	57	9,158
Landers	92	7.6	1	402
Cape Mendo	92	7.1	0	356
Joshua Tree	92	6.1	0	10
Sierra	91	5.8	1	30
Upland	90	5.5	0	38
Loma Prieta	89	7.1	63	3,757
Imperial	87	6.6	0	94
Whittier	87	5.9	7	200
Oceanside	86	5.3	1	28

Table A-2 CALIFORNIA URBAN/WILDLAND FIRES

Location	Year	Acres	Bldgs
Southern Cal	93	193,254	1,078
Oakland/Berk	91	1,600	3,354
Tehama Cty	90	18,000	27
Mariposa Cty	90	12,136	66
Riverside Cty	90	490	20
Orange Cty	90	6,640	14
Los Angeles	90	75	50
Santa Barbara	90	4,900	641

Santa Clara	89	375	17
Fresno Cty	89	11,680	22
Shasta Cty	88	7,800	58
Nevada Cty	88	33,500	312
Statewide	85	336,469	170

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