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**FACTORS AFFECTING LOCAL GOVERNMENT ADOPTION
OF
WILDLAND-URBAN INTERFACE FIRE POLICIES**

by

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**A Thesis Submitted to the Faculty of the
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DEDICATION

To Stan Brickler, who listened to my dream of some day going to graduate school and then said, "why don't you start right now." The memory of this has kept me going.

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ABSTRACT

Disastrous wildland-urban interface fires are an increasing problem throughout the United States. Local government is ultimately responsible for protection of property and life threatened by these fires. This study attempts to identify the factors that influence local policy-making in this arena.

Information for this study was gathered from a review of the natural hazard and public policy literature as well as three case studies. The case study areas are Orange County, California; Oakland California; and Eastern Pima County, Arizona.

Eight factors which influence local government policy-making were identified from the literature and confirmed through interviews. These factors include: acknowledgement; authority; participation; timing; cost; political influences; and liability. This study concluded that natural hazard research can be applied to wildland-urban interface fire. It also concluded that while there is increasing awareness of the wildland-urban interface fire problem there appears to be a need for a change of approach.

CHAPTER I

INTRODUCTION

A September 16, 1994 *New York Times* headline proclaimed, "New Hazard in Fire Zones: Houses of Urban Refugees." The *Tucson (Arizona) Citizen* headline on September 11, 1994 stated, "Lethal fire season in West blamed mostly on rustic sprawl." However, the conflict of wildland fire and housing isn't new. On October 8, 1871 the town of Peshtigo, Wisconsin was leveled and 800 people killed. In September 1923 the Berkeley Hills fire, in California, burned 150 acres, 584 buildings, and caused \$10 million in damages. After the fire, the Berkeley City Council passed legislation requiring fire-resistant wood coverings for roofs. The council rescinded the legislation before it could take effect.

Sixty-eight years later, October 20, 1991, the Oakland/Berkeley Hills Fire burned 1600 acres, 2,449 homes, 437 apartment and condominium units, and did an estimated \$1.5 billion in damage. The fire also killed 25 people and injured 150. The Laguna fire in 1993 burned 14,337 acres and destroyed 347 structures. In California 4,200 houses were destroyed in the three years between 1990 and 1993 as contrasted to the loss of 3,500 homes in the seventy years between 1920 and 1989 (National Commission n.d.).

In the United States wildfires are destroying more homes and threatening more urban areas every year. Much of this destruction is being attributed to more people moving into the "wildland-urban interface". A problem that once was thought to be unique to Southern California is now being recognized as a problem anywhere "natural"

vegetation is found next to the places people live. The frequency or extent of the problem may vary but the problem exists throughout the United States. As Anderson (1984) states, in reference to traffic congestion, "public policies, intentionally and unintentionally, have done much to bring about our current urban condition." This statement seems to also apply to wildland-urban interface problems.

Fire codes, building codes, burning codes, zoning requirements, and fuel treatment, as well as education, have been suggested as actions that might reduce the impacts of wildland-urban interface fires (Petak and Atkisson 1982; Rossi et al. 1982; Gardner and Cortner 1988; NFPA 1991b). Several organizations and agencies are involved in attempts to educate residents, local governments, and developers. Some examples are the National Fire Protection Association (NFPA) standard for *Protection of Life and Property from Wildfire* and their *Wildfire Strikes Home* newsletter, North Carolina Department of Natural Resources and Community Development's *Fire Safety Considerations for Developments in Forested Areas*, and a quarterly newsletter from Fire Safe Marin in Marin County, California (NFPA 1991b; NFPA; North Carolina 1987; Fire Safe Marin 1995). Despite these efforts, the interface fire problem persists and appears to be increasing.

Local government is ultimately responsible for the protection of life and property. It is responsible for adopting policies to either prevent the occurrence or reduce the community's vulnerability to the adverse effects of an emergency (disaster). However, few policies specific to interface fire have been adopted by local government. Why has this

been the case? What are the influences to act or not act? What are the factors that cause the adoption, or rejection, of wildland-urban interface fire policy by local governments?

This paper attempts to identify those factors that affect the adoption of policies to address disastrous wildland-urban fires by local policy-makers.

Chapter I has provided an overview of the situation and presents the question being addressed by this paper. Chapter II describes the methods used in this study. Chapter III is divided into three sections, the first presents an argument for considering wildland-urban interface fire as a natural hazard and public policy problem. The second section describes the responsibility for natural hazard, and wildland-urban interface fire, policy-making. The third section presents the information found in the natural hazards and public policy literature about the factors which influence public policy-making. It also includes a discussion of the relevance of that literature to wildland-urban interface fire problems. Chapter IV presents three case studies. The first section generally describes the case study areas. The second through the fourth sections describe the fire situation in each study area including a history of interface fire, the most recent disastrous events, and the local jurisdictions' resultant policy actions. Chapter V presents the findings from interviews conducted in the case study areas. This section also compares the factors identified in the case studies to the factors identified in the literature. Finally, in Chapter VI, the author presents some conclusions.

CHAPTER II

METHODS

A cursory review of the literature revealed that little has been written about local government policy-making for wildland-urban interface fire problems. The approach of this study is to look at examples of local policy-making and compare them to the existing literature to try to specifically identify those factors that influence local wildland-urban interface fire policy-making.

Information was gathered from two sources, a review of existing literature and a look at three specific case studies. The literature reviewed included a few general references about policy-making, but concentrated on studies that specifically address natural hazard policy-making. The search also focused on sources that presented information about local government policy-making. Information for the case studies came from unstructured interviews, meeting minutes, and reports.

The three case study areas--Orange County, California; Oakland, California; and Eastern Pima County, Arizona-- represent a spectrum of problem awareness and policy making concerning wildland-urban interface fire. Orange County, California represents an area with a relatively long history of disastrous interface fires. The most recent fires in Orange County occurred in 1993. Oakland, California represents a major urban area that, while somewhat aware of the potential problem, did nothing specific until 1991 when it experienced what has been called the worst interface fire in California history (NFPA 1991c). While there were indications as early as 1923 that a hazardous condition existed,

no special policy actions were taken. The final case study area, Eastern Pima County, Arizona, includes the City of Tucson. It represents an growing urban area which is encroaching into more flammable vegetation but has never experienced the loss of a structure or life from a wildland-urban interface fire. However, wildfires have occurred on adjacent areas that are similar to the developing interface. Eastern Pima County also was chosen because the author has more than twenty years experience in the area as a federal land manager dealing with wildland-urban interface issues, including fire. The author has worked with city and county governments as well as with planners, developers, and fire agencies.

Personal interviews of selected individuals in Orange County, California; Oakland, California; and Pima County, Arizona were conducted in 1995. The persons interviewed were chosen because they were involved with or affected by wildland-urban interface fire policy- making. Interviewees included elected officials, planning officials, fire officials, emergency management officials, and developers in each location. However, no elected official was available in Orange County. Instead, the author attended a Laguna Beach City Council meeting about proposals for future response to fires. (A list of the individuals interviewed is located in Appendix A.)

The unstructured interviews were designed to be 30 to 45 minutes long. A brief explanation of the study was given at the beginning of each interview. This explanation reiterated an overview provided by phone prior to the interviews. Five standard questions, based upon information found in the literature, were used to provide a common framework for all the interviews. The questions were constructed as open ended so that

the interviewees would not be limited by the author's values and perceptions. Questions numbers 1 and 2 were aimed at having the person identify policy actions and the factors that influence policy-making. Two of the questions, numbers 3 and 4, were used to gain a picture of the interviewee's awareness of and knowledge about the wildland-urban interface and fires within it. The fifth question asked interviewees to identify other people that might have relevant information. (See Appendix B for a script of the interview process.)

In addition, minutes from county boards of supervisors and city councils meetings in Orange County and Oakland were reviewed. The minutes covered the period from when the 1991 Oakland and 1993 Orange County fires first started until the time they were no longer a regular agenda item.

The local jurisdictions, the National Fire Protection Association, and the Federal Emergency Management Agency produced several reports about the 1991 Oakland and 1993 Orange County fires (NFPA 1991c; Oakland n.d.; Orange County n.d.; Orange County 1994). Information from these reports is used in this study to describe fire history, the fire situation, proposed actions, and in some cases policy adoption and implementation.

CHAPTER III

THE POLICY CONTEXT

This chapter describes information found in the natural hazard and public policy literature that seems to be relevant to the wildland-urban interface fire problem. The first section establishes that there is a public policy problem. The second section addresses who is responsible for dealing with this problem. The final section identifies those factors that affect natural hazard policy-making and may also affect wildland-urban interface fire policy-making.

THE WILDLAND-URBAN INTERFACE FIRE PROBLEM

The wildland-urban interface is described as having wildlands in close proximity to large urban settings (Ewert et al. 1993), or as an intermingling of wildlands with interspersed and adjacent development (Cortner et al. 1990). Davis (1990) describes three types of wildland/urban interface: classic has a clearly defined boundary; intermix has developments scattered throughout wildland; isolated is where wildland is surrounded by development. The National Fire Protection Association describes the wildland/urban interface as "an area where development and wildland fuels meet at a well defined boundary." A variation called wildland/urban intermix is "an area where development and wildland fuels meet with no clearly defined boundary" (NFPA 1991a). This paper will use

the term wildland-urban interface to include all of the variations that have been described above.

Throughout the United States residential and commercial development is being extended into areas of high fire-risk in the wildland-urban interface. This intermingling of open space and development has occurred gradually over time and usually with little knowledge about or concern for the interactions and impacts that might occur. There is an increase in probability of ignition, and protection is shifted from wildland resources to structures (National Commission n.d.).

The result of this continuing encroachment into high hazard areas is an increase in fires that threaten, damage, or destroy homes and businesses. Most fires within the wildland-urban interface are quickly suppressed with little or no loss of property or life. However, it is also true that huge fires are not required for catastrophic losses (Davis and Marker 1987). For example, the October 1991 Oakland/Berkeley Hills (California) fire covered slightly over 1500 acres but resulted in the loss of 25 lives and loss or damage to almost 3000 structures. Damage was estimated at over \$1.5 billion (Oakland n.d.). The primary fire carriers were the introduced Monterey pine and eucalyptus trees.

Nationally, wildland-urban interface fire has been recognized as a natural hazard and public policy problem. The Federal government defines "major disaster" as "any hurricane, tornado, storm, flood, high-water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snow storm, drought, *fire* (author's emphasis), explosion, or other catastrophe in any part of the United States..." (Disaster Relief Act of 1974, PL 93-288). While this definition emphasizes natural causes of

disasters it also includes human caused events such as explosions and fires. It is an interesting note that the 1973 report from the National Commission on Fire Prevention and Control deals exclusively with structural fire and says nothing about wildland-urban interface fire. However, a 1987 follow-up workshop included wildland-urban interface fire as a major topic (FEMA 1987).

There is other evidence of national recognition. In 1986 the National Fire Protection Association coordinated development of the program *Wildfire Strikes Home* (NFPA n.d.). In 1991 it issued a National Standard for protection of life and property from wildfire (NFPA 1991b). In early 1994 the National Commission on Wildfire Disasters found that, "public and private costs for wildfire suppression, loss of life and property, and rehabilitation of ecosystems and human communities over the coming decades threaten to be far higher than experienced in past decades." In August 1994 the Chief of the USDA Forest Service stated to a Senate committee that there is a need to reduce wildfire risks in the interface (U.S. Senate 1994). He argued that if this is not done the Forest Service will have a greatly diminished capacity to protect natural resource values; it will be in the interface protecting life and property. Montague and Montague (1994) made the observation that conflagrations will continue to occur as budgets become tight, the fire risk is high, and awareness is low.

Southern California has long been recognized as the place where wildfires regularly destroy homes and people. There are numerous examples of catastrophic fires that have resulted in loss of large amounts of property and sometimes lives: the 1959 Laurel Canyon Fire, the 1961 Bel Aire fire, the 1990 Paint Fire, and the 1993 Orange

County fires. California has recognized wildland-urban interface fire as a public policy problem and some steps have been taken to address it. For example, after the 1991 Oakland/Berkeley Hills Fire, California adopted the Bates Bill (Calif. Gov. C. 51175) which requires the identification of "very high fire hazard severity zones" in every county and the development of a model ordinance for use by local government. Other states, such as Florida, Colorado, Michigan, Oregon, and most recently Texas (reported in the *Arizona Daily Star* February 23, 1996) have also experienced disastrous wildland-urban interface fires (Ewert et al. 1993).

While wildland-urban interface fire is recognized at the national and state levels as a public policy problem, local government seems to be unaware of the problem, except in locations that have experienced recent disastrous fires. Again, Southern California and Oakland, California are prime examples. Many parts of the United States have not yet identified that they now have, or might have in the future, an interface fire problem. These are places where development was once only in low flammability vegetation but is now expanding into vegetation with a higher risk. There is no history of property loss or loss of life from interface fire. An example is eastern Pima County, Arizona, which includes metropolitan Tucson. Settlement in metropolitan Tucson started in the saguaro-palo verde vegetation type which very seldom has fires and generally will not carry fire due to sparse ground cover. Urban development now, however, has expanded into the brush and oak woodland vegetation types that are fire dependant systems. Such systems periodically have stand replacement and/or fuel reducing fires.

RESPONSIBILITY FOR POLICY-MAKING

People expect help when a disaster occurs. They are in a state of disbelief that this terrible event has happened to them. They believe that government has a responsibility to quickly help return their lives to "normal". They believe that they should receive assistance to rebuild and recover. They also believe that government should prevent future occurrences (Petak and Atkisson 1982).

Numerous individuals, agencies, and organizations are involved in addressing disasters such as wildland-urban interface fires. These include, but are not limited to, the public, non-governmental relief organizations, developers, the insurance industry, as well as Federal, state, and local governments.

Petak and Atkisson (1982) point out that within the United States there are a "bewildering array" of agencies and entities at all levels of government which have legal authority and responsibility for dealing with natural hazards. Auf der Heide (1989) states that this multiple responsibility may breed a lack of accountability. While primary authority lies with the state, many states, such as California and Arizona, delegate the responsibility for emergency management to local government (Calif. H-S. C., ARS 26-301). All phases of emergency, disaster, management, including preparedness, mitigation, response, and recovery, are carried out by the city or county with support and control, in the form of advice, rules, and funding, from the state and federal governments. In the event of a disaster, assistance from the state and federal governments is triggered by a disaster declaration from the local jurisdiction, the state's governor, and the President.

May and Williams (1986) do point out that the federal government has taken on an increased share of emergency management governance by giving support to the states and local jurisdictions in building response and recovery capability.

As Auf der Heide states, it is paradoxical that local government, which is least likely to see disaster management as a priority, is most likely to have the primary responsibility for that job (Auf der Heide 1989). Wildland-urban interface fire disasters are just one more of the hazards that local government is expected to address.

FACTORS THAT AFFECT NATURAL HAZARD DISASTER POLICY CONSIDERATION AND ADOPTION

The values that guide any decision-maker have been categorized by Anderson (1984) into political, organizational, personal, policy, and ideological. Political values focus on the importance of a decision to the policy-maker's political party or constituency. Organizational values include the desire to maintain power and prerogatives. Personal values are such notions as financial well-being, reputation, or place in history. Policy values may influence the person to act on the basis of their perception of what is in the public's best interest or what is morally right. Ideological values are the simplified pictures of the world. Petak and Atkisson (1982) make the point that the ability of any jurisdiction to act "may be constrained by legal, sociopolitical, administrative, economic, and other factors, including the normative commitments of its citizens and political influentials". While these broad categories can be used as a starting point for discussion of

natural hazard disaster policy-making, they do not seem specific enough for this look at wildland-urban interface fire problems and policy-making.

Several in-depth studies of natural hazard mitigation have been done but they do not specifically include wildland-urban interface fire in their list of hazards. Rossi et al. (1982) mention fires in Southern California in passing but do not elaborate upon them in their study. This is probably due to the more recent recognition of wildland-urban interface fire as a public policy problem. It does appear, however, that many of the ideas concerning natural hazard disasters discussed in the literature may be applicable nonetheless to interface fire problems.

In 1977 Rossi et al. (1982) surveyed more than 2000 state and local political elites from across the United States about “the amount and content of support for and opposition to certain non-structural disaster mitigation policies and programs.” In 1989 Mittler published a re-evaluation of Rossi’s data to identify exactly who supported and opposed non-structural mitigation. Both studies provide some information about the reasons for support or opposition. Petak and Atkisson, in their 1982 book, identified constraints on public hazards management policy making. Other authors have also offered ideas about the influences on natural hazard public policy-making (Auf der Heide 1989;

United States Fire Administration 1992; Montague and Montague 1994; National Commission n.d.). From these works the author developed a list of eight factors:

- acknowledgment and understanding of the problem.
- conflicting or competing values and interests.
- authority to act.
- participation in policy-making.
- timing; window of opportunity.
- cost and who pays.
- political influences.
- possibility of litigation.

The information taken from the literature is discussed below in more detail, and its relevance to the wildland-urban interface fire problem noted.

ACKNOWLEDGMENT AND UNDERSTANDING OF THE PROBLEM. For a problem to become part of the local policy agenda there must be recognition that the problem exists and recognition that it is a public policy problem (Petak and Atkisson 1982). Whether a situation is regarded as a problem depends upon its objective dimensions and, probably more importantly, on the way in which it is perceived by people (Anderson 1984). Lack of “good” risk data also contributes to lack of understanding and/or acknowledgment that a problem exists. Petak and Atkisson (1982) state that “A

public unwillingness to acknowledge the threat of future loss-producing occurrences in high hazard areas, and an accompanying faith that government will somehow protect them, have contributed to a continuing population movement into [such] high-hazard area..." They also point out that between disasters there is a lack of public interest and legislative activity. Another finding is that people who have not experienced a disaster tend to deny that they may also be threatened. They also found that in areas that have experienced an event the residents tend to deny that such events will reoccur. This latter point is supported by the work of Gardner et al. (1987). As Ronald Montague wrote to the author, the public's attitude is, "we don't have a fire problem," until after a disastrous fire, when it translates to, "we were unaware of the apparent dangers." Auf der Heide (1989) describes the "apathy factor." Apathy occurs when there is low probability of a disaster and the public lacks awareness, is fatalistic, or denies that a problem exists. There is also a reliance on technology for response and mitigation. This public apathy, as well as a concern with costs, results in a lack of political support for disaster preparedness. In contrast to these viewpoints, Mittler (1989) identified prior experience as the best predictor of perceived seriousness.

People may develop a false sense of security where mitigation measures have been implemented (Petak and Atkisson 1982). While the above appears to be true for the local level of government, as well as residents, Rossi et al. (1982) found that the state level of government views hazards as more serious than the local level.

Even if acknowledgment and at least some understanding exists, Rossi et al. (1982) found that elected officials do not see environmental hazards as a serious problem

in comparison to other problems. Their study indicates that the general public seems to share that viewpoint. Most communities believe the risk is too low to warrant special action (Petak and Atkisson 1982). It is interesting that another finding of Rossi et al. (1982) is that people in Southern California do not consider natural hazards to be serious problems. They did rank fires as more serious than floods or earthquakes, but possibly only because much of Southern California was burning at the time of the survey. In their survey environmental hazards were ranked lower than almost all other problems listed such as inflation, welfare, unemployment, crime, and pornography. Only race relations and too much economic growth were seen as less serious. This would support Auf der Heide's (1989) idea that interest in disaster preparedness is proportional to the recency and magnitude of the last disaster. However, Mittler (1989) found that political elites will support non-structural mitigation if they believe the hazards are serious enough to warrant action. The Oakland situation in which previous fires did nothing to cause policy change seems to illustrate the lack of seriousness attributed to wildland-urban interface fire.

Anderson (1984) stated that elected officials may feel that they lack the expertise about a subject to address a problem. One way that officials make up for this lack of expertise is to defer to the judgment of others when faced with a decision about which they have little interest or knowledge. Petak and Atkisson (1982) found that legislative bodies have skimped on obtaining or verifying the facts due to cost which may indicate why there is a perceived lack of knowledge.

Whether a condition is regarded as a problem depends upon its objective dimensions and, probably more importantly, on the way it is perceived by people (Anderson 1984).

CONFLICTING OR COMPETING VALUES AND INTERESTS. In their opening chapter, Rossi et al. (1982) state, “Unfortunately, many political solutions to the problems of environmental hazards conflict with other legitimate human values.” Examples include: evacuating low lying areas next to rivers would require radical transformation of the contemporary urban scene; depopulating coastal areas subject to hurricanes would require moving enormous numbers of people that live there; and removing parapets, cornices, and old structures in San Francisco would lessen the earthquake risk but would destroy much of the city’s charm. In regards to the wildland-urban interface, when people place a great value on open space, natural setting, and the use of vegetation to create a comfortable living space there may be conflicts with creating a safe environment (Montague and Montague 1994). People are willing to trade some degree of safety for other values especially where they see a low probability of an event happening (Rossi et al. 1982). Decision-making involves the choice of an alternative from among a series of competing alternatives (Anderson 1984). This principle applies to choosing which problems are the most important at this moment in time as well as applying to which actions to take or not take in dealing with wildland-urban interface fire problems.

While there is no documentation in the literature of the property rights issue being raised in regards to the wildland-urban interface fire problem, Ronald Montague suggests

that it may become more of an issue as local governments attempt mitigation measures (personal correspondence). The “Stress on individualism and private property finds expression in the notion that a person should generally be free to use his property as he sees fit” (Anderson 1982). However, there must be some balance between property rights and compelling social need. It should be noted that the question is not about physical seizure of property but about regulating the use of property. Cabbage and Siegal (1985) describe this as the crux of the takings issue.

AUTHORITY TO ACT. The authority to act in the case of disasters basically comes from the “police power” of government. This power is described as the valid government actions to protect the health, safety, morals, and general welfare of the community (Buck 1991). The purposes of the government action must be examined. The action is regulatory, and under the police power, if the action interferes with the uses of the property to prevent public harm. The action is a taking if the interference is for a public benefit. While there have been numerous federal and state court cases, the law remains unclear.

While the primary responsibility for emergency management is with the state, implementation is usually delegated to the local authority (Petak and Atkisson 1982). The state sets limits and informally influences local government (Rossi et al. 1982). However, having “home rule” powers allows the local government to adopt policies that are more appropriate for their individual jurisdiction. The preference of local government is that

they set policy, plan, and implement while the state and federal governments pay the bills (Petak and Atkisson 1982).

Although local jurisdictions may believe that they have the authority to act, in reality, according to Petak and Atkisson's findings (1982), there is a bewildering array of agencies and entities at all levels of government with legal authority and responsibility for dealing with natural hazards. Shannon (1991) describes the situation that faces most local governments "... policy problems at the urban-forest interface cross boundaries of land ownership, overlap agency jurisdictions, implicate a nongeographically located polity, and thus challenge conventional institutions that regulate individual behavior and provide benefits to categories of individuals."

While local government does have some authority to act it is obvious from the above that they do not have complete authority.

PARTICIPATION IN POLICY-MAKING. Anderson (1984) identifies official policy makers, including legislatures, the executive, administrative agencies, and the courts, interest groups, political parties, and the individual citizen as participants in policy-making. Davis and Marker (1987) are more specific about the entities involved in wildland-urban interface fire policy. They list homeowners, fire protection agencies, local and regional planners, media and communication experts, insurance carriers, builders, contractors, architects, and training and motivational experts.

Anderson goes on to point out that a significant factor can be a very vocal advocate that "touches a nerve" such as Rachael Carson did with *Silent Spring* and Ralph

Nader did with *Unsafe at Any Speed*. Mittler (1989) supports this concept by saying that there is a small but growing body of literature indicating that only a few enthusiastic supporters can secure adoption and implementation of public policy. He highlights two of Wyner and Mann's (1983) factors as being especially relevant: first that a small cadre of officials must lead the fight, and second that there must be staff ability and interest in order to keep policies on the local agenda. He calls these people "issue champions." Rossi et al. (1982) found that those people whose positions require it, such as planning and public works departments and elected officials, pay more attention to hazard mitigation.

One conclusion of the Rossi et al. study (1982) was that there is no widespread support for, or opposition against, non-structural hazard-mitigation measures. However, Mittler's re-analysis (1989) of the data found that support is found mostly in urban communities. This support might be explained by urban areas having more people and property at risk and because urban governments have money and available staff. Opposition was correlated with residents in rural communities, liberals from large northern cities, and individuals with a conservative orientation to government regulation in general. Opposition by the northern city liberals may be based upon their perception that other problems are more critical.

Anderson (1984) believes that leadership may be an important factor in agenda setting. For whatever reason, an official may seize upon a particular problem and propose a solution.

TIMING; WINDOW OF OPPORTUNITY. Immediately after a severe disaster there is a high level of public support for action to prevent future occurrence. Most federal disaster policy changes have occurred in the aftermath of a catastrophe (May and Williams 1986). However, in the rush to do something during the emotionally charged period right after a disaster many proposals may be advanced and even enacted into law that are imprudently drafted. Mittler (1989) states, based upon his own experience and discussions with practitioners and researchers, that few localities were able to pass natural hazards legislation even though most communities are at some risk. He found, when comparing attitudes, that knowing whether or not a community supports non-structural mitigation is a poor indicator of whether they will enact legislation in a short period of time. Kingdon (1984) suggests when the policy window is open an issue must meet three criteria to be placed upon the agenda: there is an advocate; the legislative body understands that they have the authority to act; and there is an acceptable plan of action. Between disasters there is a lack of public interest in hazard related legislation and correspondingly a lack of legislative activity (Petak and Atkisson 1982).

COST AND WHO PAYS. The costs of disasters can be categorized as obvious or hidden. The obvious costs include the implementation and maintenance of emergency management activities such as preparedness, structural mitigation measures, response to the disaster, and recovery activities to restore the community. There is a limit on the money available to government for all programs and there is competition for it as is pointed out in the section on competing and conflicting interests. Anderson (1984) states

that "...resources are very unequally distributed among state and local governments, which affects their ability to deal with...problems..." He also states that local officials appear to be more strongly influenced by economic factors than state officials. Hidden costs might include the increased price of housing due to increased construction standards (Petak and Atkisson 1982).

Clary (1985) says that in dealing with the question of risk, policy-makers often gamble that a hazard event will not happen rather than incur long-term preparedness costs even if that means there will be higher costs if a disaster does strike. Even if preventative and response capability is increased after a disaster, policy-makers will begin to question continued operations and maintenance costs after some period of time with no recurrence.

The type of policy proposed has a major influence on who pays. Public policies can be allocative/distributive, regulatory, structural, and redistributive (Lowi 1964). Several authors have stated that policy-makers highly prefer distributive rather than regulatory policies (Petak and Atkisson 1982; Rossi et al. 1982). Distributive policies such as, structural mitigation and post-disaster recovery, policies are favored (Petak and Atkisson 1982). Such actions as disaster relief, low cost loans, and subsidized insurance encourage rather than inhibit private risk-taking. These preferences shift the burden of paying from the individual affected and the local community to the state or national level. As Montague and Montague (1994) note, there is little incentive for fire protection planning and mitigation. Somewhat in contrast to these statements, Clary (1985) says that natural hazard policies at all levels of government are characterized by an increasing emphasis on regulation and other approaches to control or prevent hazard events. He

goes on to state that the natural hazard policy action most frequently used by state and local government is regulation.

POLITICAL INFLUENCES. Anderson (1984) makes the point that, "policy-making is 'political,' it involves 'politics,' and there is no reason either to resist or to denigrate this conclusion,..." "On hazard-management issues in local communities, elected decision makers react first and foremost to the political factors extant in their community, and generally not to what they perceive to be the policy needs of the community" (Rossi et al. 1982). Petak and Atkisson (1982) state that the official will ask what a proposal will do for his/her own constituents as well as for his/her chances for re-election. Anderson (1984) believes that party affiliation is the best indicator of how a [Congressman] will vote on issues. Rossi et al. (1982) support this idea in regards to natural hazard policy-making by saying that political party affiliation reflects political philosophies. Stated in the simplest stereotypical terms, application of political philosophies to wildland-urban interface fire policies would mean that a liberal Democrat might favor government action while a conservative Republican might not.

Rossi et al.'s study (1982) determined that location within the United States indicates willingness to accept non-structural hazard-mitigation policies; the Northeast and Mid-west are more willing while the South and West are less willing.

Anderson (1984) might have best summarized the political influences in his statement, "...the decision-maker's values are probably the most direct and pervasive criteria for deciding what to do" (Anderson 1984).

POSSIBILITY OF LITIGATION. Petak and Atkisson (1982) describe legal constraints on natural hazard public policy-making. One constraint is whether or not local government has been delegated the authority to act which has been discussed above. Another major legal constraint is in proper execution of that authority. Petak and Atkisson (1982) state that jurisdictions are comparatively free to act on natural hazards problems as long as they are attentive to a few important legal criteria:

- public purposes are specified and there is evidence that action is not “wholly unreasonable.”
- the law is enacted using constitutionally sound procedure.
- just compensation is provided when public health, safety, and welfare are not the purpose.
- enactment is responsive to a public purpose.
- the required procedures are reasonable.
- regulation is not unduly burdensome.

There was no evidence in the literature searched of governments being sued over natural hazard disasters or mitigation actions.

SUMMARY

Based upon the natural hazard and public policy literature it appears that wildland-urban interface fire is being considered a public policy problem at the national and state levels of government. Except where there has been recent experience with a disastrous fire, it is probably not considered a public policy problem at the local level of government. Even in locations with recent experience there may be denial that the disaster will recur thereby making policy changes unnecessary. This situation is especially poignant in that it is the local level of government that has primary responsibility for emergency and disaster management. There appear to be several factors that influence natural hazard policy-making that are also applicable to the wildland-urban interface fire problem.

CHAPTER IV

CASE STUDIES

As stated earlier, the three case studies, Orange County, California; Oakland, California; and Eastern Pima County, Arizona, represent a spectrum of problem awareness and experience about wildland-urban interface fire.

GENERAL DESCRIPTION OF STUDY AREAS

As can be seen in table 1, Orange County has the largest total population. The county includes 31 municipalities as well as a large undeveloped portion. Most of the undeveloped area is owned by large development companies, such as the Irvine Company, which are producing new subdivisions. It is a growing urban area. However, within the county are several small communities, such as Laguna Beach, that currently border large undeveloped areas i.e., have a wildland-urban interface.

Oakland is an established city. It is almost completely surrounded by other cities. Growth is occurring mostly as individual homes or businesses. Its wildland-urban interface occurs primarily as the intermix described earlier i.e., development is scattered throughout a large area of flammable vegetation.

While most of Pima County is undeveloped it is similar to Orange County in that Eastern Pima County is highly urbanized. Much of the growth is occurring in new subdivisions developing on the perimeter of the current urban/suburban area. One

difference between Eastern Pima County and Orange County is that a large portion of the growth is occurring in unincorporated areas of the county. The Town of Oro Valley is similar to Laguna Beach in that it is a smaller jurisdiction within a larger urbanized area and has wildland-urban interface.

Table 1 Comparison of the Study Areas.

| Location | Population | | Land Area (square miles) | | |
|---------------------|------------|--------------------------|--------------------------|--------|---------|
| | Total | Density (per sq. mi.) | Total | Cities | Rural |
| Orange County | 2,410,556 | 3,052.2 | 789.7 | 501.0 | 289.7 |
| Laguna Beach | 23,170 | 2,663.2 | 8.7 | 8.7 | 0.0 |
| Oakland | 372,219 | 6,646.8 | 56.0 | 56.0 | 0.0 |
| Pima County | 660,880 | 72.6 | 9,187.0 | 247.1 | 8,939.9 |
| Eastern Pima County | 579,235 | 2,349.8 | 247.1 | 247.1 | 0.0 |
| Oro Valley | 6,649 | 410.4 | 16.2 | 16.2 | 0.0 |

Source: Bureau of the Census 1991.

THE 1993 ORANGE COUNTY FIRES

Orange County has a well documented history of disastrous wildfires (Orange County n.d.); table 2 presents a sampling.

Table 2. Wildfire Disasters in Orange County, California

| Year | Fire Name | Damage |
|------|------------------|--|
| 1943 | Santa Ana Canyon | 2000 acres burned |
| 1948 | Santa Ana Canyon | 45,000 acres burned |
| 1967 | Paseo Grande | 48,698 acres, 46 homes destroyed, 1 person killed, \$4.2 million damages |
| 1976 | San Clemente | 2,400 acres, 15 homes destroyed, 12 injured, \$1 million damages |
| 1982 | Anaheim | 50 buildings destroyed, 10 injuries, cost \$50 million |
| 1982 | Gypsum Canyon | 16,800 acres, 20 structures destroyed, \$20 million damages |
| 1989 | Ortega/Riverside | 6,100 acres, 13 structures destroyed |

Between October 26 and November 4, 1993 Orange County experienced three major fires which burned at the same time. Together they burned more than 36,000 acres, destroyed or severely damaged 469 homes, and required the evacuation of the entire City of Laguna Beach. All of this occurred with no loss of life. The three fires were the Ortega which burned 21,385 acres and 19 structures, the Anaheim Hills which burned 750 acres and 2 structures, and the Laguna which burned 14,337 acres and destroyed 347 structures (Orange County n.d.). One earlier wildfire that had an effect on the Laguna

Beach fire was the 1979 Boat Canyon fire which burned up to the edge of the City of Laguna Beach. There were no losses in that portion of the 1993 Laguna fire due to the previously fire (interview).

Six key issues were identified after the fires. One was the depletion of available local resources due to the occurrence of multiple major incidents. In addition to the three incidents within Orange County, there were 10 other fires burning out of control in Southern California. Another part of this issue is the time it took for mutual aid to arrive. A second issue was the lack of fire-fighting aircraft in the early stages of the fires. Third was the lack of ground resources to support aircraft retardant drops because the resources were committed to structure protection. The fourth issue covered water problems. These problems focused on an unbuilt reservoir, pump power failure, low water pressure, limited alternative water sources, and firefighting water use strategies. Fifth was the overloading of the emergency communications center during peak periods of the fires. Lastly was the delay of planned fuel treatment in Emerald Canyon which would have reduced fuel density and, therefore, fire intensity. The delay was caused by weather and public opposition to burning.

In December 1993 a multi-agency task force made up of representatives from the fire services, planning departments, water districts, the Building Industries Association, developers, landscape architects, and conservation-related organizations was formed to identify the steps necessary to preclude a re-occurrence of the 1993 firestorm (Orange County n.d.; Orange County 1994). The task force was charged with addressing the issues relevant to the wildland-urban interface and to develop (1) a safer model

development standard for the county's wildland-urban interface, (2) recommendations for retroactive mitigation measures to be taken in already developed areas, and (3) a model wildland-urban interface inspection and enforcement program. The task force made recommendations regarding wildland hazard reduction inspections, training, water, education, codes, fuel modification, and open space management. The recommendations are contained in *The Report of the Wildland/Urban Interface Task Force (Orange County 1994)*. The report includes: a wildland hazard reduction inspection program; proposed amendments to the 1994 Uniform Building Code and Uniform Fire Code; fuel modification plan guidelines for high fire hazard areas; a wildland fire management planning model; and model ordinance and resolutions. Where applicable, the recommendations are tied to the Bates Bill's (Calif. Gov. C. 51175 et seq.) very high fire hazard severity zones. The task force urged the various jurisdictions to adopt the entire package of recommendations as a start at addressing the entire wildland-urban interface fire issue. Adoption, however, is the responsibility of the individual jurisdictions i.e., the county and each municipality.

Once the task force completed its work the county and the individual municipalities faced several major policy issues including: (1) finding the funding for additional firefighting and support resources; (2) correction of water problems; (3) fuel modification; (4) standards for new development; (5) standards for retroactive mitigation for existing development; and (6) how to enforce new standards and rules.

The first issue, acquiring additional firefighting and support resources, is being currently discussed by the county and several of the municipalities. One example is

occurring in the City of Laguna Beach. The author attended the Laguna Beach City Council meeting in October 1995 where one of the main discussion items was whether to contract with the Orange County Fire Authority or keep the city's own fire department. The Laguna Beach Fire Chief argued that it was in the best interest of the community to keep its own fire department. He said that contracting would increase costs and reduce service. The Orange County Fire Authority representative said that other cities were contracting with the fire authority because it resulted in reduced overhead costs while still maintaining response time. Seventy-five percent of the Laguna Beach firefighters felt, after having a fact finding committee, that the city would be better off with the fire authority. They said that contracting would result in better working conditions for firefighters. Currently there is no contract between the firefighters and the city. Several residents spoke in opposition to contracting. They were concerned about the newness of the fire authority and that it had no track record upon which to be judged. They didn't want to see a loss of the extra services they enjoyed under the current arrangement. The speakers were worried that the standards of the large district, Orange County Fire Authority, may not be appropriate to Laguna Beach. One council member said that this was not a budget issue but that the community wants service and its own fire department. Several council members did say that efficiency is a consideration. Another council member was concerned about loss of control. The result of the meeting was that the council instructed staff to return within four months with a definition of levels of service and recommendations about salary equity, training problems, equipment, etc.

The second issue facing the various Orange County jurisdictions is the correction of water problems. Five items were identified: an unbuilt reservoir, pump power failures, low water pressure, lack of usable alternative water sources, and water use strategies used to fight the fires (Orange County n.d.). However, water is supplied by districts that are independent jurisdictions; the county and municipalities have no direct powers over them.

Again, Laguna Beach can be used as an example. There had been a proposal to build a large reservoir at an elevation that would have allowed gravity feeding; in the current system the bulk of the water is stored at lower elevations and requires pumping. Construction of the reservoir had been debated for several years with, apparently, many residents opposed due to the construction impacts (council minutes). During the 1993 fire there was a power failure to the pumps that fill the storage facilities most needed by the firefighting efforts. Lack of stand-by generators compounded the water problems because it took three hours to bring in a portable unit. Another significant factor is that the water system was not designed to provide the volumes of water used to fight the fire. While there were some alternative water sources available the fire apparatus were not equipped to make use of them. And finally, most firefighters on-scene were not experienced with water use strategies for wildland-urban interface firefighting. At their November 12, 1993 meeting the city council passed a motion to work with the water district to get the reservoir built.

The third issue, the fuel modification program applies only to new construction and is proceeding as written (interview). The county is doing some work in older areas. One of the primary fuel modification tools is prescribed burning. Other techniques being

used are mechanical treatment and grazing with goats. All techniques cause disturbance to open space and have been generally greeted with disfavor by residents. It is difficult to balance desired open space values with safe living. People are still resistant to burning because it leaves a black spot. Threatened and endangered species consideration affect what activities are permitted. While weather and fuel conditions may postpone activities these other values can stop implementation.

The Bates Bill required Orange County, along with several others, to complete mapping of "very high fire hazard severity zones" by January 1995; the remaining counties in California had until January 1996 to complete the mapping. The Orange County Fire Department developed the original maps then submitted them to the California Director of Forestry and Fire Protection; the bill required the Director to recommend the mapping to the local jurisdiction. The local jurisdiction could accept, modify, or reject the mapping based upon substantial findings. In October 1995 the City of Irvine was the first jurisdiction in Orange County to act on the proposed map. It accepted the map as presented. The map that was presented was different from what was originally proposed by the Orange County Fire Department. Some developers persuaded the fire department to exclude more of their development from the zone. The developers advocated drawing the zone boundary line at the edge of a property if the property had a Class A/B roof, setbacks met the standards, and there was fuel modification on the adjacent open space (interview). The developer's proposal was based upon the fact that existing fuel modification was successful in stopping the west side of the 1993 fire (interview). The implication of this change seems to be that if an alternative, in this case defensible space,

can be developed by the landowner, that meets the intent of the standards, the alternative can be adopted by the jurisdiction.

In addition to requiring that the severity zones be identified, the Bates Bill charged the State Fire Marshal with developing a model ordinance for adoption of the zones by the local jurisdiction. The Orange County Wildland-Urban Interface Task Force developed model ordinances and has submitted them to the state for adoption (Orange County 1994).

Issues four and five, standards for new and existing development, are being addressed primarily through revisions of the building and fire codes. These codes are adopted every three years and were being revised at the time of the interviews. The task force recommended amendments to both codes that specifically address the interface fire situation. The deadline was January 1, 1996 for the revisions to be developed (interview). The last issue, enforcement of the standards, had not been discussed at the time of the interviews. Again, it is up to each local jurisdiction to adopt the codes.

THE 1991 OAKLAND/BERKELEY HILLS FIRE

In Oakland prior to October 1991 wildland-urban interface fire was recognized as a potential problem but was considered secondary to other fire problems (NFPA 1991c). The September 1923 Berkeley Hills fire burned 130 acres, 584 buildings, and caused \$10 million in damages. It generated some call for action but the only policy adopted was by the Berkeley City Council that required fire resistant roofing. This legislation was rescinded before it could take effect. In 1942 the War Department identified a fire

problem in the Oakland Hills that posed a danger to military facilities but no local policy action was taken. In September 1970 a fire destroyed 38 homes, damaged 7 others and caused \$3.5 million in damages. All of the homes destroyed were rebuilt only to be destroyed again in the 1991 fire. Additional “warnings” i.e., fires, occurred in 1975 and 1980 (NFPA 1991c; U.S. Fire Administration n.d.). The Oakland Fire Department was able to handle these fires, however, because conditions were not all that severe (interview).

Prior to 1991 the fire suppression focus was on the downtown with its high value buildings. Individuals within the Oakland Fire Department were aware of the interface fire problem but with 20 runs per day in the “Flats” versus 20 runs per month in the “Hills” it was considered secondary. During the 1960's a fuelbreak program was carried out in cooperation with the East Bay Regional Park District (interview). This was an isolated effort with no connection to an overall interface hazard reduction or prevention program. The interface fire problem was not formally brought to the City Manager or Council (interview). There was no organized advocacy group.

After the October 1991 fire, awareness and calls for action greatly increased. Major issues identified (U.S. Fire Administration n.d.) as a result of the fire included:

- risk factors such as highly combustible natural fuels and buildings; narrow streets.
- shortage of command officers.
- a communications system that quickly became overwhelmed.
- lack of mitigation efforts identified from previous fires.

However, immediately after the fire, rebuilding the community in a timely manner became the primary goal of the residents and the City Council. This sentiment was expressed by several people at the 10/22/91 City Council meeting. The goal evolved into, "To rebuild the community quickly, efficiently, and sensitively,..." (Oakland n.d.).

In furtherance of the goal, recovery assistance from the Federal, state and local agencies was consolidated at the Community Disaster Assistance Center. When the disaster center closed a Community Restoration Development Center opened. The purpose was to provide a "one stop shopping" center to assist residents in rebuilding; a place to process planning and building permits. The restoration center was close to the problem, expedited the process, and was able to produce operations manuals for the City Operations Department. A streamlined planning, design review, and permitting process was established. This interim process was simultaneous rather than sequential. The immediate changes were in the process not the regulations (interview). The interim process was discontinued when the center closed. One major problem with the restoration center was that it worked on limited information and its actions were not closely scrutinized (interview). It wasn't until December 1991 that the interim building, fire, safety and zoning codes (City of Oakland Emergency Order No. 6) were adopted for the fire-damaged area.

Even though the primary thrust was on rebuilding, work was being done on how to address the prevention and mitigation of future events. The Oakland Hills Firestorm After Action Report (Oakland n.d.) lists over 150 recommendations from a variety of sources that cover such topics as: preparedness/training, communications/warning,

mitigation, mutual aid, evacuation, recovery-vegetation management/soil erosion, public information, rebuilding, Emergency Operations Center operations, shelters, food services, volunteers, and miscellaneous. Most recommendations deal with operating procedures and techniques. One estimate is that as of 1995 only 15 to 20 percent of the recommendations had been implemented (interview).

Response was strengthened after the fire with the passage of Measure I, which had been developed as a result of the 1989 Loma Prieta Earthquake. The measure provides funding for such things as facilities strengthening, securing emergency shelters, reinforced bridges and overpasses and an improved communications system that is eventually planned to include all city operations.

As a result of the fire the Oakland Fire Department has received increased funding to add equipment, additional command staff, and to institute training on interface fire response. It should be noted that equipment and training for structural and wildland firefighters is very different. However, members of the Oakland Fire Department are concerned that privatization of the emergency medical system, rescue, and fire services will be used as a method to address the resource needs. They are worried that their jobs would be eliminated (interview).

The Citizens of Oakland Respond to Emergencies (C.O.R.E.) program was started because neighborhoods found themselves without assistance for 2 or 3 days after the 1989 Loma Prieta Earthquake. The idea is to train citizens to help themselves, their families, and their neighbors. Currently there are 3 modules. A fourth is proposed as a result of the 1991 fire that will specifically train and equip residents to assist the fire department in

battling interface fires (C.O.R.E. brochure). There is a debate between some citizens and the fire department about the role of C.O.R.E. volunteers in firefighting. Some citizens see themselves as becoming a "volunteer fire department" that would be equipped to protect structures. The fire department sees the role as evacuating residents, guiding fire equipment into proper locations and then getting out of the way (interviews).

The city council has passed improved roofing and exterior construction standards. The requirement for residential sprinklers was defeated after much debate (*The Montclarion* February 28, 1992). Replacement power lines within the fire area have been placed underground. The proposal for emergency power supplies with diesel fuel storage for the "Hills" was not implemented because it costs too much. The need to improve the water supply system was identified but the city council has no direct control over the system. The East Bay Municipal Utility District provides water to not only Oakland but also to most of the other cities on the east side of the San Francisco Bay. The utility district said that a study was needed about how to improve water pressure in the "Hills" area. To date the study has not been done. There was discussion about which streets to widen or change but there was a feeling that nothing could be done due to the terrain and existing layout.

A Fire Assessment District, which includes the 1991 fire area and other high hazard areas, was established. The district is overseen by a citizen appointed commission (interview). A property assessment provides funding for activities which include a vegetation management program, increased fire patrols on high hazard days, and monitoring fire weather (interview; Oakland n.d.). The University of California at

Berkeley conducted research about appropriate landscaping materials (interview). Prior to the fire it was very hard to get a tree removal permit. After the fire no permit is needed for pine removal (interview).

A new Zone, S14, was eventually developed and adopted for the fire area:

“PURPOSE AND INTENT. The S-14 Zone is intended to guide the construction of residential facilities in the Fire-Damaged Area of the City of Oakland. The S-14 Zone is intended to promote: reconstruction that will replicate, to the extent possible, the pre-fire conditions that contributed to the distinctive character and desirability of the Fire-Damaged Area neighborhoods; design and construction that is responsive to the substantial variations in topography, access, and parcelization both within and among the respective neighborhoods; facilitation and expediting of reconstruction to minimize economic and emotional hardships for the fire victims; and prevention of conditions that pose threats to life and property.”

The S14 zone established different footprint, i.e., surface area impacted, height, setback, and landscaping requirements. However, in the effort to quickly restore the area some buildings that do not conform were approved prior to the adoption of the S14 Zone. In addition, there was no accurate information about the size and design of structures prior to the fire so that people were given the benefit of a doubt when they requested approval for the replacement structure (interview). Rebuilding has resulted in structures having a 15 to 20 percent larger footprint and being an additional story taller (interview).

Fights erupted over loss of views (interview; council minutes). The standards established for the "Hills" fire area were not adopted for any other areas. One planner would like to see them adopted for all of the City of Oakland because "they are more practical," i.e., more streamlined and usable (interview). As a result of the fire the Planning Department did obtain enhanced computer and geographic information systems. By 1995 they were not able to take advantage of these capabilities due to reduced staff.

THE EASTERN PIMA COUNTY POTENTIAL

Pima County has never experienced a disastrous wildland-urban interface fire and no structures have ever been lost. However, there is a history of wildland fires on lands adjacent to the urban areas of the county (Coronado National Forest fire history). A few of the larger ones that threatened urban development include: 1979 Jesus, 2485 acres; 1987 Seven Falls, 4100 acres; 1987 Pusch, 1200 acres; 1992 State Park, 1581 acres; and 1993 CSP, 762 acres. All of these fires burned in vegetation similar to what is now found in some suburban areas which are within the wildland-urban interface. The Jesus, State Park, and CSP fires all burned in the same general area near the village of Catalina and the Town of Oro Valley. The CSP fire was stopped at the edge of yards in the village of Catalina (author's personal experience).

In about 1988 local administrators from the Coronado National Forest and Saguaro National Monument, both of which are adjacent to expanding urban development, began working with developers, Pima County, and the City of Tucson to

develop an awareness of potential wildland-urban interface problems including the possibility of losses from fire. A presentation was made to the Pima County Board of Supervisors in 1988 (author's records). These federal administrators were also working with the local fire agencies to increase awareness. The result of some of this early work was changes to some new developments adjacent to public lands such as providing access routes, providing adequate accessible water supplies, and designing roads and building pads to create a more firesafe situation. This work has achieved some isolated improvement but nothing significant in the total wildland-urban interface situation. Even with this effort there have been no changes in policy by either Pima County or the City of Tucson. Wildland-urban interface fire is not seen as a problem.

It is interesting to note that the water supply situation in Pima County is somewhat similar to that found in California. The county has no direct control over water. However, the City of Tucson does control water supply for the city and a significant portion of Eastern Pima County. There are also several smaller independent districts that serve the area.

CHAPTER V

FINDINGS: FACTORS IDENTIFIED FROM THE CASE STUDIES

This section describes the factors that were identified from the three case studies. It presents the opinions and perceptions of the people interviewed, the author's understanding from attending one Laguna Beach City Council meeting, and information obtained from minutes of board of supervisors and city council meetings. The factors identified from these sources were compared to those developed from the natural hazard literature to see if there is any consistency. After reviewing this information it became apparent that the same eight factors developed from the literature are applicable to the case studies.

While each individual interviewed did not identify all the factors gleaned from the literature, all the factors were identified by at least one person and most by several people. The persons from Oakland spoke about the 1991 fire and the 1989 earthquake as though they were similar events i.e., natural hazard disasters.

ACKNOWLEDGMENT AND UNDERSTANDING OF THE PROBLEM

The case studies clearly show a lack of acknowledgment prior to experiencing a disastrous fire as evidenced by lack of action even with a history of destructive fires. Denial that a fire problem exists, or denial of the seriousness of an acknowledged fire problem, was cited by people from all three locations as a major factor in policy adoption

(interviews). The viewpoint in Orange County and Oakland was, "it can't happen to us." This viewpoint developed, in part, due to lack of information about the potential problem and lack of understanding of the possible magnitude of a fire (interviews). People in Orange County and Oakland are now paying attention because they have had personal experience. One person observed that in Orange County several things came together at the same time, i.e., the Laguna fire, formation of the Orange County Fire Authority, and the passage of the Bates Bill. Since having had two disasters, the 1989 earthquake and the 1991 fire, the Oakland City Council has placed emergency preparedness in their top 10 city goals. Council and board minutes from Oakland, Laguna Beach, and Orange County all record the public outcry for the elected officials to act. There is no obvious consensus about what should be done. That there is a public policy problem was acknowledged, at least at that time. As one official commented, some desirable changes will never be feasible, such as the widening of streets in the Oakland "Hills".

However, in Pima County the perception is that there is no problem. It is believed that Pima County is different than Southern California, i.e., there is a low probability in Pima County of losing a home because there have been no losses to date. As one person pointed out, there is no research to support the notion of a problem (interview). Officials see no threat to be mitigated, insurance costs will not be lowered, and there is no liability for non-action (interviews). Elected and agency officials are aware of the wildland-urban interface fire problem but consider it a non-issue in Pima County. One Pima County official saw the 1991 Oakland fire as an "aberration", it was just a one time type of event (interview). As one official said, "a problem becomes a public problem when it goes from

a good community goal to a government responsibility.” All of these comments might indicate that awareness doesn’t transfer from one jurisdiction to another, i.e, awareness is a localized variable.

Lack of a big picture or overall view of the situation was cited by one citizen as a factor in policy-making. Elected officials and some agency officials are not looking beyond the borders of their individual community. The interface fire problem may be, and usually is, a regional problem (interviews from Orange County and Oakland). This lack of looking beyond the boundary may be a reflection of times when the communities were more separated. It may also reflect the fear of losing control and power.

There is a belief by elected officials and some fire officials in Eastern Pima County, and some Orange County communities, that their fire department can handle any and every situation. This can develop into an isolationist attitude. For example, prior to the 1993 fires Laguna Beach felt they could stand on their own and the county ignored them (interview). Some Pima County officials have the perception that the fire departments can handle interface fires because they are “just vacant lot fires” (interview). This probably indicates that they have no idea of the number of homes that have been built in areas of flammable vegetation.

Sometimes elected officials are faced with multiple agencies giving conflicting advice. The officials may also believe that they lack the necessary expertise to make decisions. The locals officials don’t know what to accept (interview). This then muddies the understanding of the problem. An example is the debate in Laguna Beach about whether or not to contract for fire services. Another example was the question in Orange

County about whether to seed or not to seed grasses after the fires. The county staff said no, the California Division of Forestry said yes. The U.S. Soil Conservation Service was willing to pay for the seeding. As one official said, it is difficult for the local government to go counter to the state recommendations especially when someone else is willing to pay. This issue was resolved through a compromise. Those watersheds without urban uses were not to be seeded. Those watersheds with urban uses were to be seeded using a native plant mix. In the end there was not enough seed available to do the work (interview).

All of the above seems to indicate that wildland-urban interface fire problems are viewed the same as other natural hazard problems. There is denial of a serious problem until one occurs; then there is a clamoring for action.

CONFLICTING OR COMPETING VALUES AND INTERESTS

Even if an interface fire problem is identified there are conflicting or competing values and interests that influence policy adoption. Environmental sensitivity, endangered species, esthetics, i.e., wood shake roofs, and historic preservation were specifically identified during the interviews as conflicting with adoption of hazard reduction policies. In both Oakland and Orange County people choose locations due, at least partially, to the existing vegetation; they may or may not have known there was a fire hazard. Even after the fires in Orange County there is still resistance to prescribed burning because "it leaves a black spot" (interview). In Oakland there are the conflicting values between people that

were not burned out and those that were (city council minutes). The former thought that the government should be concentrating on mitigation and protection from future events while the latter thought the government should concentrate on recovery and preventing further damage as a result of the fire. In Laguna Beach there is a concern about loss of local control and personalized service (Laguna Beach minutes). The conflicting interests and perceptions about firefighting resources for the city is an example of the dilemmas facing local elected officials.

The significance and magnitude of the wildland-urban interface fire problem in relation to other problems is a major factor. An example of a competing issue is Oakland's uncompleted recovery from the 1989 Loma Prieta earthquake. There is a concern by some Oakland community members that the fire recovery was taking away from recovery of the people affected by the Loma Prieta earthquake that occurred 2 years prior (Oakland minutes). The 1993 \$1.7 billion bankruptcy of Orange County or the \$65 million of recent storm damage are other examples. These other issues appear bigger and more probable. Even other natural hazards are more important. Based on frequency of occurrence, earthquakes are a bigger problem in Oakland than interface fires (interview). People interviewed in Eastern Pima County believe that there is an acceptable level of risk that people are willing to take. This seemed to be because the interface fire problem is seen as a non-issue. This position lends weight to Rossi et al. (1982) findings about low probability events.

In both Oakland and Orange County, as well as Laguna Beach, the board of supervisors and city council continued handling regular business during and immediately

after the disaster (minutes). While many of the items on the agendas were routine matters some were controversial issues not related to the disaster or to natural hazards. This illustrates the fact that elected officials see other issues as being as important, or more important, than the natural hazard issue. In part this might be explained by the fact that the fires directly affect only a portion of the community.

Some people have other agendas when addressing a disaster. For example, in Oakland the issue was raised several times about how to ensure that there is continued support for and use of city minority programs in the after fire recovery efforts (city council minutes). Other examples cited are affirmative action and historic preservation. The need to make sure affirmative action programs are applied to recovery and preparedness activities was expressed by both elected officials and the public. However there seems to be a nagging fear that the city would not continue this support. One official interviewed was concerned that excessive amounts of money was being spent to repair existing structures in the name of historic preservation. He felt that new construction that replicated the historic values would be much cheaper. While these may not be conflicting or competing interests they can affect the elected officials' decisions (interviews). This illustrates the inter-relatedness of issues.

Developers' desires were seen by some as a factor. Some people interviewed did not see developers as being in opposition to trying to mitigate the interface fire problem (interviews). This appears to be in conflict with conventional wisdom. Others saw developers as not wanting any responsibility. One official described the developers' viewpoint as being "if there are no enforceable standards then there is no problem."

Orange County was convinced by one large developer to modify the proposed “high fire hazard severity areas” map because they were designing the subdivision to be safer and instituting a hazard reduction program that would become the responsibility of the homeowners association. Developers of large tracts are able to expend the resources to develop information and plans that can influence policy making (interviews). This is because the costs are a small portion of a larger investment. This suggests that larger developers will be able to obtain concessions from local government. It also suggests that small developers may have to look to other mechanisms if they want a policy modified.

Several people interviewed questioned what effect hazard designation would have on the marketability of a development or the sale of an individual home. The fear is that property would be devalued or become unsaleable, especially for the individual owner or small developer. In one case a large developer is publicizing the fact that the development is protected due to design and hazard reduction programs. Whether recognition of the fire hazard in a location will adversely affect marketability appears to be up for debate. People do continue to build and move into areas affected by the Orange County and Oakland fires.

According to several individuals interviewed, the reluctance to “mess with” private property resulted in not taking advantage of the opportunity to improve a hazardous situation. For example, there was the opportunity to extend the revised zoning standards to all the hazard areas in the Oakland Hills. However, most standards are applied only to the 1991 fire area (interviews). The implication may be that there is a fear of causing a taking of private property rights or the desire to not increase housing costs. Another

example cited by one Oakland official is that poor planning resulted in the poor access in the Hills area. Now the city would have to “take” property to remedy the situation and there is a great reluctance to do this (interview). Cost, the fear of litigation, and fear of political consequences might be some of the reasons for the reluctance.

AUTHORITY TO ACT

Everyone interviewed said that local government had all the authority to act that was needed. While there was agreement that the local community has the authority to act, several asked, “will they?”

The involvement of multiple jurisdictions was cited by several people as affecting what could be done. The problem of multiple jurisdictions is pointed out in the reports about the 1993 Orange County and 1991 Oakland incidents (Oakland n.d.; Orange County n.d.). The wildland-urban interface fire problem usually is a regional problem which crosses jurisdictional boundaries. This situation manifests itself in several forms. First, it may cross political boundary lines. For example, the Oakland/Berkeley Hills Fire burned in Oakland, Berkeley, and Contra Costa County. The Orange County fires burned in several cities, the county, and on the Cleveland National Forest.

Another form is that several fire and planning agencies may be involved. For example, The Orange County Fire Authority contracts with most, but not all, cities within the county and with the county to provide fire protection (interview).

A third form is when control over critical resources, such as water and power, is with separate, independent agencies or companies. For example, The East Bay Metropolitan Utility District provides water to not only Oakland but also to most of the East Bay region. It is an independent entity over which the City of Oakland has no direct control. According to several people interviewed in both Oakland and Orange County, water districts are reluctant to upgrade older areas because they are faced with lots of new development that take most of their available resources (interview). The districts may fear this additional work will require an increase in rates.

This information validates what Petak and Atkisson (1982) and Shannon (1991) say about jurisdictions believing they have authority but that fragmentation does indeed diminish that authority.

PARTICIPATION IN POLICY-MAKING

The picture that came from the interviews is that advocates are needed if the wildland-urban interface fire problem is to be placed on the public policy agenda and kept there. As one official put it, "there must be a citizen outcry." Another person stated, "there must be vocal citizens that keep the issue in front of the council." Two planning officials are looking for someone with "strong credentials", an expert, to advocate action. In the same vein another person thought the expert should be non-government. A non-government advocacy group is needed according to another person. Oakland Council Member Dick Spees was identified by several people as the person leading the way in

disaster policy-making. He might be an “issue champion” as described by Mittler (1984). However, the more general perception by people interviewed is that the advocates identified in the literature as necessary haven’t been present in the past. No significant policy action occurred prior to the 1991 and 1993 fires and some of the local activity appears to be in response to state mandates, i.e., the Bates Bill.

TIMING; WINDOW OF OPPORTUNITY

Immediately after the fires in Orange County citizens called for prevention of future events and an increased ability to respond (minutes). This illustrates the opening of the window of opportunity described in the literature. This is the time in which action is most likely to occur. One example of using this window is in regards to the proposed reservoir for Laguna Beach. After experiencing the fire, the Laguna Beach City Council changed their position and voted to get new reservoir constructed (council minutes). However, as one Oakland Official pointed out, there may be immediate action but that action may not be the best; elected officials will act quickly with little deliberation (interview). An example of the window of opportunity only being open for a short time is that only 15 to 20 percent of the recommendations of the Oakland After Action Report (Oakland n.d.) have been implemented. However, occurrence of the 1991 Oakland fire was credited by some people interviewed with helping the passage with Measure I which had been drafted in response to the 1989 Loma Prieta earthquake.

It appears that what has happened, and continues to happen, in Oakland and Orange County fits the natural hazard literature description of a limited time to initiate legislative action. However, the increased awareness and broadened advocacy in both locations has kept an impetus for change alive. In part this may be in response to state mandates, i.e., the Bates Bill. Another reason appears to be the recent multiple disasters experienced in each area.

COST AND WHO PAYS

Cost and who pays were cited by many of the people interviewed as significant factors. Who pays appears to be the more important of the two. One person in Oakland felt that funding was not a problem because most would come from sources outside the city. When funding can be obtained from other sources the local policy makers are somewhat more open to action. For example, recovery is mostly funded by the federal and state governments as well as private insurers. The Federal Emergency Management Agency and the California Office of Emergency Services will reimburse a significant amount for nuisance abatement (council minutes). Federal Emergency Management Agency grants have been approved for vegetation management, fuel modification inspections, and homeowner education for Orange County (interview). All of this seems to reflect the perception of local government that they should set policy, plan, and implement while the state and federal governments should pay the bills (Petak and Atkisson (1982). In contrast to the above, in Oakland some mitigation costs are being

funded by direct assessments on the properties involved (council minutes; interviews).

Property owners are supportive because they have some control over the activities through the citizen commission that oversees the Fire Assessment District.

Several other Oakland examples have been previously cited that show that costs do affect policy-making. They include not installing back-up power supplies for the water system and the defeat of the residential sprinkler requirement. The back-up power supplies would have been paid for by the city while the sprinklers would have added to the consumer cost of the homes.

Another area of concern voiced by several people, including elected officials and developers, is the increased costs of construction due to increased standards. Increased construction costs due to increased standards were questioned as to whether they were worth it (council minutes). Another cost item deals with requiring changes to existing development and buildings. There is a reluctance to impose additional costs on existing uses, a reluctance to require changes to existing development (council minutes). This reluctance might be attributed to not wanting to put additional burdens, costs, on homeowners, i.e., voters.

POLITICAL INFLUENCES

The political impact on officials was cited by several people, including one elected official, as being an important factor (interviews). Politicians don't want to make decisions that will affect them while in office or their chances for re-election (interview).

One person described it as the “will to act”. It appears that constituent desires and the elected official’s personal values are the primary influences.

THREAT OF LIABILITY AND/OR LITIGATION

Most of the people interviewed felt that local government was not open to liability from the event, i.e., fire (interviews). While this appears to be consistent with the literature there appears to be a heightened concern by elected officials about liability and a fear of litigation. This concern requires government to appear to be doing everything possible to aid recovery and to prevent further damage in order to avoid being held liable (interview). Government must also do everything reasonable to prevent or mitigate future occurrences. One elected official that was interviewed noted that officials will be alerted to the possibility of litigation when an investigation occurs that asks, how can government let this happen? Another person interviewed believes that this fear will force jurisdictions to work together.

Local officials appear to be very sensitive to the takings issue. The concern about street widening in Oakland is one example. Pima County has experienced the threat of litigation and the actual loss of several court cases on zonings and rezonings. None of these involved natural hazard mitigation but have caused the local officials to be very cautious about any appearance of taking in any action. This may be an over-reaction to past experience.

It appears that if local government follows the criteria cited by Petak and Atkisson (1982) they will be able to address natural hazard mitigation, including the wildland-urban interface fire problem with a minimum possibility of liability or litigation.

CHAPTER VI

CONCLUSIONS

This study has shown that factors identified in the general natural hazard literature as affecting local policy adoption are also applicable to wildland-urban interface fire. Because until recently, interface fire had often been neglected in the overall natural hazard literature, this finding should be of assistance to both researchers and policy-makers. In some instances, there may be no need to repeat research specifically to account for wildland-urban interface situations. Findings drawn from the natural hazard literature generally can also be a valuable resource for wildland-urban interface fire problem-solvers.

From this study it does appear that people are becoming more aware of the wildland-urban interface fire problem, but there is still a denial of its seriousness except by those people that have very recently been affected by a disastrous fire. Even they, however, quickly shift their focus to other more immediate issues. Due to the infrequent and unpredictable nature of these disasters, other issues are bound to take priority. In some cases it may be that fire actually is a lesser priority than other issues.

There seems to be some incremental improvement in addressing this fire problem over what was happening 10 to 15 years ago. For example, there are new actions by the Federal Emergency Management Agency at the national level, and some states, such as California, have adopted more specific state standards and requirements. In late 1995 the International Fire Code Institute released a draft model *Urban-Wildland Interface Code*. This code is designed to set minimum standards that all communities can adopt. The

individual communities could then include additional requirements specific to their needs. The institute expects to finalize the model in 1996. However, in these times of clamoring for less government intervention and control, local elected officials may have little inclination to increase regulation of any kind. Why try to act on something that you do not believe will happen again?

If wildland-urban interface fire problems are to be addressed there is a need for "issue champions" at the local level. There needs to be a vocal group of respected individuals both inside and outside government. To increase the effectiveness of these issue champions, so their work will be complementary and supportive, it may be advantageous for them to become an organized group. A second activity of these advocates might be to develop educational materials, using existing information, targeted at the various audiences. Another activity might be for these advocates to be ready to take advantage of opportunities, such as near misses or nearby disasters, to increase awareness and understanding of citizens, agency officials, and elected officials. Examples of information that might be on hand include hazard identification procedures, model ordinances and codes, and model educational programs. This information could be easily acquired from other localities, such as Orange County, California, and then adapted to the specific location.

One item for further research would be how California's Bates Bill became law and was implemented. This information would appear to be of value to other states, such as Arizona, that are just now recognizing the wildland-urban interface problem.

As the National Commission on Wildfire Disasters concluded, people must pay now, for preparedness and mitigation, or pay later, for response and recovery, to live in the wildland-urban interface.

APPENDIX A: LIST OF PEOPLE INTERVIEWED**Orange County, California**

- James Radley, Assistant Chief, Orange County Fire Authority
- Timothy Neely, Administrator, Planning & Zoning, Environmental Management Agency
- Loletta Barrett, Director, Office of Emergency Services
- Kymbra Fleming, Office of Emergency Services
- James Lormar, Vice President, Irvine Community Builders

Oakland, California

- Dick Spees, Vice-Mayor, Council Member
- Reginald Garcia, Battalion Chief, Oakland Fire Department
- Bill Uber, Information Officer, Planning and Building Department
- Wayne Wada, Process Coordinator, Planning and Building Department
- Ann Clevenger, Planner-Design Review, Planning and Building Department
- Henry Renteria, Emergency Services Manager
- Mel Copland, developer
- Don Pearman, citizen
- Neil Honeycutt, formerly with Oakland Fire Department

Pima County, Arizona

- Mike Boyd, County Supervisor
- Rick Evans, Battalion Chief, Tucson Fire Department
- Frank Beleauh, Principal Planner, Pima County Planning and Development Services
- Dennis Douglas, Director, Tucson-Pima County Office of Emergency Management
- Chris Monson, developer

APPENDIX B: INTERVIEW SCRIPT

Who to interview: The following types of people from the City of Oakland, California; Orange County, California; and Pima County, Arizona will be interviewed. While the primary people to interview are the decision makers, the other people will help to present a more complete picture of what was proposed and why the proposals were adopted or not.

- Elected official, preferably one that was present during the fire.
- Planning official, one that has developed or implemented recommendations.
- Fire official, one that was present during the fire and/or has made recommendations.
- Emergency management official, a non-fire person that was present during the fire and/or has made recommendations.
- Developer, someone that did work in the fire area before and after the fire who has been affected by any policies adopted, or not adopted.

Questions: there are five main questions. The subset of each of these will be used as a checklist to ensure consistency among interviews. The focus of the interviews is to identify the factors that affect policy adoption or non-adoption. Avoid spending time discussing "how to fight fire".

It is assumed that the people from California already recognize that interface exists and that there is a fire problem. Therefore, they will be asked Questions 1, 2, and 5.

It is assumed that the people in Pima County, Arizona will not have much, if any, understanding of interface and interface fire problems. Therefore, they will be asked Questions 3, 4, 1, 2, and 5.

1. What has been done about the interface/intermix fire problem? Why or why not?

-What are the pressures to act or not act? Who are the pressures coming from? Why?

-Who was supportive/not supportive of the policies? Why?

-Who has the authority or responsibility to act? What responsibility and authority does local government have?

-What local policies have been adopted? (Also search ordinances and meeting minutes.)

-Have past fires caused policy changes? If so, what was done?

-What standards exist? (Also search ordinances and meeting minutes.)

-When were the policies and standards adopted?

-What policies were suggested/recommended but not adopted? -What are the implications to policy makers from not adopting these measures? Is there any liability?

2. What else could be done?

-Who has the authority and responsibility to act?

-Does local government need more or different authority deal with the problem? If so, what and why?

3. Is there interface/intermix? Do people recognize its presence?

-Have you heard of interface?

-What is it?

-Is there interface/intermix within the community?

-Where?

-How much (a % of total community)?

-Is it native or introduced?

-Why are interface/intermix areas important?

-To whom?

-What are the primary uses of interface?

-What incentives stimulate these uses?

-Who lives within the interface/intermix?

-Who is interested in or affected by there being interface?

4. Is there a fire problem?

-Who says so?

-Is there a current fire problem?

-Is there a potential fire problem?

-How severe, in each case?

- Has the current or potential problem been adequately described?
- Who is involved in or affected by the problem?
- What land uses are most/least compatible where there is a fire problem?
- How important is the fire problem compared to other issues the community is facing?
- How aware or knowledgeable are residents/landowners about the problem?
- What are their perceptions? (Compare this information to responses to studies of residents awareness and perceptions.)

5. Who else should I talk to?

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