

Wildfire Mitigation and Private Lands: Managing Long-Term Vulnerabilities

Brian Muller, Assistant Professor, and Stacey Schulte, Doctoral Student, University of Colorado at Denver, College of Architecture and Planning, Environmental Design Building, Boulder, CO

Abstract—Long-term management of wildfire vulnerability requires strategies that address complex interactions between fire ecology and human settlement. In this paper, we examine the integration of wildfire mitigation and land use planning in county governments in the western U.S. This research relies on data from two sources. First, we conducted a survey of land use mitigations in over 300 forested counties in the Western United States. Planning directors in each county were asked to identify and assess land use planning tools adopted in their county for the purpose of reducing wildfire risk. Second, we interviewed wildfire mitigation staff from 10 Colorado counties to better understand problems in implementation of land use mitigations. We find that many forested counties across the Western U.S. have adopted land use mitigation programs focusing on regulation of new subdivisions and public education. Many fewer counties have adopted regulatory programs focusing on existing structures or development of individual parcels outside subdivisions. Rapid rates of development outside subdivisions may pose substantial, continuing wildfire risks in Western U.S. counties that are not addressed in many land use mitigation programs.

Introduction

During the past five years the western United States has incurred increased economic and social costs due to wildfire. In this period billions of dollars have been spent on fire suppression, hundreds of structures have burned and many firefighters have lost their lives (NIFC 2004). One of the primary reasons for the increased costs of wildfire is development in the wildland-urban interface (WUI). With high rates of development over the past three decades many WUI communities in the Western United States are increasingly at risk for loss of property, life, and scenic value. In response to increased exposure to wildfire, hundreds of communities have developed strategies to alleviate wildfire danger through planning and public education. This paper examines the impact of wildfire mitigation planning based on interviews in 10 Colorado counties and survey data from 300 counties in the western U.S.

Background

As fire-prone areas become more populated an increasing number of individual and social assets are exposed to wildfire. In addition to firefighting, the social costs of wildfire include other emergency response expenses,

mitigation, property loss by individuals, loss of natural resources and loss of human lives. In 2000 alone, over eight million acres of public land burned; suppression costs were over \$1.3 billion; 731 structures were destroyed; and sixteen firefighters died (National Interagency Fire Center 2004). The arid Intermountain West lives under persistent threat from wildfire and is also the fastest growing region in the country.

Communities address wildfire vulnerability through emergency response and mitigation. Mechanisms for emergency response are well established but increasingly expensive as more and more homes in mountain communities need to be protected. Mitigation programs are less well established but are the focus of discussion in many communities as they look for ways to diminish the danger and cost of wildfire. Mitigations are often promoted by fire chiefs who see that the danger posed by development in high-risk areas may exceed their capacity to respond. Federal Emergency Management Agency (FEMA) regulations encourage communities to adopt plans for hazards that include land use mitigations. The Hazard Mitigation Grant Program and the Pre-Disaster Mitigation Programs call for communities to have locally adopted, all-hazard mitigation plans by November 1, 2004 in order to be eligible for mitigation grant money (FEMA 2004). While these regulations are expected to generate a considerable number of new plans,

many land use-related wildfire mitigation programs are already in place.

Prior research offers conflicting perspectives on the value of land use strategies in wildfire hazard mitigation. A study of wildfires in California found that no homes were lost in communities with comprehensive wildfire planning; a number of structures were lost in communities that had not adopted land use planning or regulation designed to reduce wildfire impact (Rice and Davis 1991). Other research suggests that site and building codes are more effective than land use controls in reducing damage from wildfire (Scott 1995). Studies of building site and construction show that defensible space (Manning 1990, Ramsey and Dawkins 1993, Wilson and Ferguson 1986) and roof material (Foote 1994, Rice and Martin 1996, Wilson 1988, Wilson 1962) are effective means of reducing structure loss from wildfire.

Study Method

This paper is part of a larger effort to evaluate the influence of wildfire mitigation on land use planning practices

in county governments. In this paper, we review the types of land use mitigation programs adopted at a county level over the past decade and their implications for reducing risk. This research is based on two data sources. In the spring of 2004 surveys were sent to over 300 county planning directors and wildfire mitigation coordinators in California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Washington and Wyoming. In order to target those counties with highest wildfire risk the survey was limited to counties containing U.S. Forest Service land. Respondents were asked to identify and evaluate land use planning tools that are used to reduce wildfire risk. They were also asked to describe risk assessment, the structure and financing of their programs, implementation and effectiveness. The statistics below are based on a 57 percent response rate. The second data source is a series of interviews conducted with officials from county planning departments, building departments and fire districts in 10 Colorado counties (tables 1 and 2). In Colorado, the catastrophic fire season of 2002 motivated many communities across the state to develop wildfire mitigation programs. The objective of the interviews was to find out how counties are responding to increased

Table 1. Subdivision Regulations by County in Ten Colorado Counties.

County	Emergency Access	Defensible Space	Building Standards	Building Site Location	Firefighting Water Supply
Archuleta	x	x		x	x
Clear Creek	x	x		x	x
Delta	x		x		
Eagle	x	x	x	x	x
Gunnison	x*	x*			
La Plata	x	x			x
Ouray***	x	x	x	x	x
Routt	x	x	x*	x	x
San Miguel					
Summit	x	x	x		

Table 2. Individual Property Regulations by County in Ten Colorado Counties.**

County	Emergency Access	Defensible Space	Building Standards	Building Site Location	Firefighting Water Supply
Archuleta					
Clear Creek		x	x*		
Delta					
Eagle	x	x	x	x	x
Gunnison					
La Plata					
Ouray***	x	x	x	x	x
Routt	x		x*		
San Miguel					
Summit		x	x		

*only in overlay zone

**does not include regulations for renovations

***regulations based on point system

wildfire hazard, how effectively land use measures are working from the perspective of mitigation planners, and what county officials think are the obstacles to use of land use planning as a wildfire mitigation tool. Respondents were asked to identify and evaluate land use planning tools that are used to reduce wildfire risk and describe the role of perceived risk, risk assessment, and structure and financing of their programs.

Findings

According to our survey results, land use mitigations have been adopted widely among county governments in the Western U.S. 72 percent of respondents have plans, policies, or regulations that address wildfire mitigation through land use planning. Twenty-one percent have a staff person dedicated to wildfire mitigation. Thirty-eight percent have received funding from federal or state sources. Sixty-seven percent of responding counties have undertaken hazards mapping to identify high hazard areas. Thirty percent of responding counties indicated they have public facilities policies that mitigate wildfire hazard, for example requiring proximity to water supply or fire station. These programs are of two types. (1) Mitigation of Existing Development. Hazard can be mitigated on existing development through education, assistance and other encouragement for mitigation of homes and neighborhoods through fuels management and other site-specific investments. (2) Mitigation of New Development. Future development can be mitigated through regulations that require defensible space, fire-resistant construction and “firewise” designs. Mitigation of new development occurs through regulation of subdivisions or individual properties.

Mitigation of Existing Development

Survey respondents indicate that mitigation of existing structures is more difficult to implement than mitigation of new development. Requiring mitigation on existing properties is “politically unpopular.” As a result, many counties have turned to voluntary education and assistance programs. Fifty percent of survey respondents said they have public education programs and 39 percent have fuel management assistance for private property owners.

Respondents had varying assessments of the value of education and voluntary mitigation assistance. “Making them [county residents] understand the long-term risk is difficult” according to one emergency management director. He estimates that only 25 percent of homeowners in his county are mitigating voluntarily. After the catastrophic fire season of 2002, a wildfire mitigation

officer in another county put an advertisement in the local newspaper offering free mitigation assessments. “My phone rang off the hook” she commented, adding that people understand the benefits of mitigation after even a little education. Without mitigation education, “Everyone thinks they have their own private engine.” What many homeowners do not understand is that firefighters are more willing to defend houses that have already been mitigated.

Officials in most counties feel that insurance companies could have a significant impact on homeowner mitigation by making mitigation a requirement for coverage. A site development inspector commented, “What would help is if all the insurance companies would get on the same page. That would make my job a lot easier.” At least one insurance company, State Farm, has started to create a market incentive for mitigation by telling policy holders that they need to be “Firewise.” The company has initiated a pilot program of assessing policyholders’ properties for wildfire risk.

Mitigation of New Development

Mitigation for new development is the focus of most county programs. These mitigation requirements are implemented through subdivision review, site review or building permits. Most survey respondents from Western U.S. counties have adopted some subdivision regulations related to wildfire risk; individual lot development appears to be regulated more loosely from a wildfire perspective. For example, more than half of the respondents regulate water supply and emergency access on subdivisions; less than a third have adopted regulations in these areas for individual lots. The exception to this regulatory distinction between subdivisions and individual lots concerns building codes. About one-third of the respondent counties use building codes to regulate wildfire risk for subdivisions, and about the same percentage on individual lots.

In Tables 1 and 2, we present types of regulations adopted in Colorado case study counties. These regulations have been generalized for comparative purposes. For example, we have aggregated defensible space requirements, which in different counties can be anywhere from 30 feet of cleared area around a home to over 100 feet depending on the nature of the building site. These tables suggest again that the regulatory apparatus for individual lots is less well-developed than for subdivisions.

In our interviews, county officials expressed significant concern about wildfire risk from individual lot development, which dominates growth patterns in many areas of Colorado. They discussed four primary obstacles to wildfire regulation for individual lot development.

1. State law exempts large parcels from subdivision review. County planners argue that they have limited powers of development review on larger lots (which comprise the majority of new wildland-urban interface development in many counties). In these counties, mitigation planners feel that building codes are the only legal mechanism available to them for enforcing mitigation on larger lots, and that building codes have limited effectiveness.
2. Counties do not have the staff time to implement regulations on individual properties. Although many county mitigation planners would like to adopt regulations that affect individual parcels they would also need new staff to implement the regulations. Creating new staff positions is not feasible for most counties in a time of fiscal austerity.
3. Political culture in many counties is “anti-regulation.” Although the demographic makeup of western counties is changing rapidly, there continues to be considerable resistance to government regulation. Wildfire mitigation regulations are often seen as an infringement on private property rights.
4. There is little public demand for more wildfire regulation. County officials indicate that residents of the wildland-urban interface were responsive to educational programs after the dramatic fire season of 2002. They had forgotten about wildfire risk by the next season, however. Officials say that over the past two years they have a hard time getting residents to come to public meetings or read educational material. As a result there is little pressure on public officials to create or strengthen regulations.

Conclusion

A substantial percentage of new development across the West is now occurring within the framework of wildfire land use regulations. In this respect, land use planning tools are an important and growing dimension of overall wildfire mitigation practice. However, use of these tools continues to be restrained by the political culture of many

rural areas. Existing development is weakly regulated. New development outside subdivisions also receives less attention in the mitigation planning process. Rapid rates of development outside subdivisions may pose substantial, continuing wildfire risks that are not addressed in many land use mitigation programs.

References

- Federal Emergency Management Agency. (2004) <http://www.fema.gov/fima/planning.html>.
- Federal Wildland Fire Management Policy and Program Review (1995) Federal Register 60(120):32492.
- Foote, E. I. D. (1994) Structure Survival on the 1990 Santa Barbara Paint Fire: A Retrospective Study of Urban-Wildland Interface Fire Hazard Mitigation Factors. M. S. Thesis, University of California, Berkeley, 294 p.
- Manning, D. (1990) “Vegetative Management in the Wildland-Urban Interface.” Fire Management Notes. 51(4):14-15.
- National Interagency Fire Center. (2004) Wildland Fire Statistics. www.nifc.gov/stats.
- Ramsey, G. C., and D. Dawkins. (1993) Building in Bushfire Prone Areas: Information and Advice. CSIRO SAA Handbook 36.
- Rice, C. E. and R. E. Martin. (1986) “Hazard Assessment for Potential House Loss through Wildfire.” In: Proceedings of Intl. Union of Forest Research Organizations. Ljubljana, Yugoslavia.
- Rice, C., and J. B. Davis. (1991) Land-Use Planning May Reduce Fire Damage in the Urban Wildland Intermix. Gen. Tech. Rep. PSW-127. Berkeley, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 13 p.
- Scott, T.A. (1995) “Prefire Management along California’s Wildland/Urban Interface: Introduction and Session Overview”. In: Brushfires in California’s Wildlands: Ecology and Resource Management. International Assoc. of Wildland Fire, Fairfield, WA. pp. 3-10.
- Wilson A. A. and I. Ferguson. (1986) “Predicting the Probability of House Survival during Bushfires.” Journal of Environmental Management 23:259-270.
- Wilson, A. A. G. (1988) “Width of Firebreak That Is Necessary to Stop Grass Fires: Some Field Experiments.” Canadian Journal of Forestry 18: 682-687.
- Wilson, C.C. (1962) “A Progress Report on Forest Fire Prevention Research.” In: National Fire Prevention Workshop, 1962.