



The August 2009 Station Fire, which threatened Southern California citizens living in La Canada Flintridge, Glendale, and Altadena. Credit: ©Jeremys78 Dreamstime.com.

## Getting Public Involvement in Wildfire Hazard Mitigation

### *Summary*

In many areas of the U.S. where wildfires are a recognized hazard, public agencies have taken steps to involve the public in reduction of the risks. Programs have ranged from purely voluntary public education to building codes for new buildings and ordinances for vegetation control. Some local governments provide free or subsidized services to reduce fire risks. Recently enacted federal and state policies encourage local government to become more active in managing wildfire hazards.

Interest in creating local public programs to achieve hazard reduction has sparked research into which steps will have the most success in achieving hazard mitigation. Recent research sponsored by the Joint Fire Science Program studied programs in four separate communities in the U.S. with a goal of evaluating which programs were the most practical and effective.

Research began with the use of focus groups to discern levels of public understanding and acceptance of programs. This stage was followed by a targeted survey in each of the four communities. Analysis of collected data found which programs were most successful and created public willingness to achieve program goals. These results will be helpful in selecting and enacting fire hazard reduction programs in the future.

## Key Findings

- Effective fire hazard mitigation programs can contain both voluntary and mandatory elements.
- Mandatory programs will be accepted by homeowners if the perceived risk of wildfire is high, and program compliance is equitably enforced.
- Generally, homeowners are most influenced by programs that are locally based.
- Important program elements often include one-on-one training, multiple stakeholder involvement, and help with disposing of vegetative waste.
- Homeowners accept the concept that they, along with their neighbors, must all be involved in wildfire hazard reduction if the program is to be effective.

## Wildfire at the urban interface

Recent decades have seen increasing concern about the effects of wildfire at the wildland-urban interface (WUI). Growing residential development in and adjacent to forests, shrublands and grasslands has led to increased exposure of these developed areas to wildfire. A large proportion of local, state and federal wildfire prevention and control efforts are currently directed towards protecting life and property in developed areas. Researchers have shown that local-level actions are the most effective in reducing fire hazards in these areas, but at this local level it is sometimes more difficult to motivate people to take appropriate steps to protect their communities.



In many areas, residential properties have high exposure to wildfire because of construction characteristics and proximity to large, flammable vegetation. Local government is becoming increasingly proactive in requiring homeowner mitigation of these hazards.

In the past decade, state and federal agencies have created strong incentives for local governments and agencies to become more proactive in managing the risks of wildland fire, resulting in a proliferation of local policies, ordinances and programs. These programs focus on the concept of “defensible space.”

The goals of defensible space programs are to prevent the loss of homes and other structures, to prevent injuries and the loss of lives of residents, firefighters and animals, to increase the likelihood of structure survival, and to reduce the difficulty and cost of firefighting. The intention is to create a partnership of agencies, homeowners and other stakeholders to share in the prevention of wildfire and maintenance of appropriate fuel levels.

Examples of defensible space rules include the use of fire-resistant roofing materials, reduction or elimination of landscape vegetation adjacent to residences, elimination of woodpiles or other flammable accumulations near homes, and assuring easy property access for firefighting equipment and personnel.

### What programs work?

Local government approaches range from simply offering public information on avoiding wildfire risks to enacting specific ordinances backed up with regular inspection activities to assure compliance. Recommendations or ordinances often include designation of zones surrounding residences and other buildings. Here major vegetative growth is to be avoided or strictly minimized, or native non-flammable varieties should be used. Also, they generally include requirements for fire-resistant building materials, at least for new construction or when roofing replacement takes place.

### Research objectives

The Joint Fire Science Program recently sponsored a research project into individual responses to voluntary and mandatory programs to mitigate fire hazards. The Principal Investigator was Dr. Christine Vogt, associate professor at Michigan State University. Co-principal Investigators were Gregory Winter of Cornerstone Strategies of Bellingham, Washington, and Sarah McCaffrey, research social scientist at the Forest Service in Evanston, Illinois.

Research involved two phases. Phase I was a qualitative approach using focus group interviews with homeowners at three research sites. The purpose of the focus group studies was to explore which aspects of local wildland fire policies are associated with homeowners’ support and compliance. Phase II of the research used surveys to empirically test the conceptual models developed in Phase I.

For Phase I, focus groups were conducted in Oakland, California, Ruidoso, New Mexico, and Grand Haven, Michigan. In Phase II a fourth area, Larimer County, Colorado was added. Significant contrasts exist between the WUI fire programs in the four locations.



Focus groups and surveys were performed in communities where there was a clear risk from wildfire and mitigation programs were already at one stage of development.

### Study site characteristics

**City of Oakland, California.** Oakland has a long-standing mandatory vegetation management ordinance that was enhanced in 2003 by a voter-approved property tax assessment proposition to provide additional inspection, enforcement and homeowner services including yard waste disposal. The 2003 initiative created a Wildfire Prevention District covering more than 22,000 homes in the Oakland Hills areas.

The District has full-time staff inspecting each property at least once per year to determine property owner compliance with state and local hazard mitigation laws.

**City of Ruidoso, New Mexico.** Ruidoso is a small village of about 9,000 permanent residents and a large seasonal population that is in the process of establishing a defensible space program, including mandatory vegetation management.

**Grand Haven Township and nearby areas, Michigan.** This area has no mandatory regulations, but township fire department officials recently partnered with Michigan State University to develop defensible space guidelines and education materials for homeowners along the fire-prone shoreline of Lake Michigan.

**Larimer County, Colorado.** This county requires new construction in wildfire hazard areas to comply with mitigation regulations. These include fire-resistant construction and vegetation management to create a defensible space around new buildings.

### Range of policies

According to researchers, the four research sites fall on a continuum of wildfire defensible space policies, ranging from completely voluntary (Grand Haven) to completely mandatory (Oakland). All sites require new homes to be constructed of fire-resistant materials, and only the Grand Haven site does not also require that new homes' landscaping and vegetation be consistent with defensible space guidelines.

### Sampling homeowner attitudes

Two homeowner focus groups were held in each of three study sites—Ruidoso, Oakland and Grand Haven. Focus groups followed a standard interview guide to elicit discussion on the local wildfire risk, homeowner mitigation actions, and knowledge and perspectives on the local

### Focus group findings

The focus group discussion yielded six main themes regarding defensible space policies and practices, and the social dynamics of living in the WUI.

#### **Everyone Shares Responsibility for Fuels**

**Management:** Landowners and government agencies share responsibilities for managing WUI fuels. It is important for local government to communicate well with homeowners, showing exactly how to comply, especially with vegetation management.

#### **Mandatory Regulation May be Justified:**

Mandatory regulations are in conflict with traditional property rights, but such ordinances may be justified when the risk of wildfire is high. Noncompliance puts neighbors and others at risk.

**Policy Implementation Requires Attention:** If mandatory regulations are justified by high wildfire risk, they need to be enforced fairly and uniformly. Local officials should be available for consultations. Letters mailed to each property owner assure that the message is received. Education efforts should be repeated frequently.

**Other Local Policies are Needed:** Defensible space policies alone are not enough. Local government needs to include wildfire concerns in the planning process and in zoning regulations.

**Certain Subgroups Heighten the Risk:** Those who do not comply with defensible space regulations or guidelines heighten the risk for everyone by practicing unsafe behavior.

**Other Factors Influence Compliance:** The level of compliance with defensible space regulations and guidelines are influenced by the cost of necessary measures, and the degree to which other land use objectives compete with firesafe landscape objectives.

community's fire risk mitigation programs. Participants were also asked to share their perspectives on risk mitigation programs that exist in other communities. Discussions were recorded and transcribed.

### Survey tests homeowner attitudes

Using the focus group results, researchers then used a survey process to question a broader group of homeowners and collect more data on beliefs and opinions on fire mitigation measures. The respondents were predominantly male, and over half were age 60 or older. Few were in the 19 to 39 age group, and, except in Oakland, respondents were more likely to be retired than employed full-time. The majority had household incomes greater than \$100,000 per year. In Ruidoso, seasonal or part-time residents were most common, while full-time respondents made up the majority in the other three study areas.

Survey participants were asked to rank their concern about wildfire compared to other local issues such as crime, schools, and the economy. In Larimer County and Ruidoso, the wildfire threat was seen as the greatest concern, while

in Grand Haven it was of the lowest concern. In Oakland, it was in the middle. Homeowners were asked about the likelihood of a wildfire occurring near their neighborhoods during the next five years.

The Larimer County group rated the likelihood of a wildfire highest, but still with an overall mean of “somewhat likely.” In all four study sites, the likelihood of a home being damaged was rated lower. In the two mandatory policy areas, the likelihood of a wildfire causing home damage was rated significantly higher than in the voluntary policy sites, but overall was still seen as “low.”

### **Knowledge of ordinances weak**

At all four study sites, the survey revealed that knowledge of property codes or vegetation management ordinances was often weak. Most respondents answered “not sure” when asked how local ordinances regulated building construction, landscaping and vegetation, and fire department inspections. In Oakland, only 30 percent understood that fire-resistant landscaping and vegetation are required for existing homes, yet nearly all (94 percent) knew that annual inspections of landscaping for fire safety are required.

Researcher Greg Winter indicates that people in all three focus groups and the surveys indicated they wanted on-site assistance. “They wanted help, in person, at their property, in determining what to do. For example, they wanted specific guidance on what trees to prune, and how. They also wanted to ask questions about how the program will be enforced so they can be reassured there will be something like a grace period so people can get used to it and to see that it will be fair.”



Generally homeowners understood the concept of mandatory defensible space ordinances as long as they were fairly enforced and there was a clear understanding of the requirements.

### **Defensible space practices**

Homeowners were asked which, if any, of eleven defensible space practices they had instituted on their property. The list included vegetation management practices and decisions about structural features of the house, including building materials. Almost half of the Grand Haven Township homeowners had taken none of the actions and did not practice defensible space, whereas almost nine out of ten homeowners in the other three study sites had instituted at least one of the eleven items.

A majority of respondents indicated that most of the vegetation or home features were applicable to their

properties. Respondents were in a high level of agreement that defensible space practices, “improves the way my yard looks,” “makes sense to do because insurance can’t replace everything,” and is “a good way to protect my home in case of a wildfire.” Mandatory policy sites had a slight edge in these responses over voluntary sites. Across the board, homeowners slightly disagreed that defensible space management “costs too much,” agreeing that the initial effort was more work than the subsequent maintenance.

### **What influences action?**

Respondents were asked about perceived influences by government and other stakeholder programs in taking action on defensible space management. The majority of homeowners rated most items as having neutral to little influence. Several items received significantly higher influence scores in the mandatory policy study sites—Oakland and Ruidoso.

About 42 percent of respondents in Oakland and 29 percent in Ruidoso indicated they were motivated at least in part by local vegetation management programs. One in ten homeowners in Ruidoso was motivated by insurance companies. This suggests that recent outreach and education efforts by insurance companies in that area have been effective.

In Larimer County and Grand Haven Township, very few respondents were motivated by laws. Compared to the mandatory sites, homeowners in the voluntary policy areas rated neighborhood associations, as well as University Extension personnel, as having significantly greater (but still low) levels of influence on their use of vegetation management techniques to protect their homes.

Homeowners indicated that their individual participation was most important, but participation by other property owners was also deemed important. In these mandatory policy areas, homeowners had more positive attitudes about the entire range of fire protection approaches.

They were particularly positive about the value of curbside pickup of yard waste resulting from defensible space efforts by themselves and contractors. Having educational materials or presentations on defensible space received moderately positive ratings from homeowners in all four study sites.

### **Interpreting the survey results**

Using demographics and other factors found to be important in wildfire literature, the researchers used statistical analysis to evaluate behavioral patterns. For example, the analysis showed that the factor that is most predictive of supporting mandatory vegetation management ordinances is the belief that local government is responsible for requiring property maintenance by the homeowner. Gender, age and income were not predictive of support for a mandatory policy.

Vogt feels that the perception of hazard is important in helping homeowners accept mandatory programs. She adds, “I also think the density of and value of housing and the involvement of city or county government (rather than

township government, which offers fewer services) may also have a role in acceptance by homeowners.”

Vogt also believes that the size of the area for which defensible space programs are required or encouraged is relevant. In the New Mexico and Michigan programs, activities were initiated in the neighborhoods at greatest risk. Vogt says, “I think those efforts being seen by the rest of the community have the potential to positively influence acceptance.”

Researchers also used statistical analysis to conclude that in all four sites, predicting a homeowner’s own evaluation of their efforts to maintain vegetation for fire safety was influenced by their own understanding of the risks, and their confidence in being able to initiate change with their properties.

Researchers viewed the four communities as being at different points on the scale of fire hazard program development. Levels of public awareness differed with the length of time the programs have been in existence. Another variable is the degree to which local programs have educational elements only or require mandatory compliance.

Researcher Winter feels that mandatory programs can work and “are worth the effort (including political costs) when the risk to the community is high, including the risk that neighbors pose to each other in non-compliance.” Thus, in Ruidoso and Oakland, mandatory vegetation management has been accepted.

In Larimer County and Grand Haven, there was acceptance on the need for local programs and education, but not local ordinances. Assistance with vegetation management programs seems to be important in all communities. This assistance includes consulting, education and help in disposing of vegetation waste.

Homeowners indicated a need for more defensible space training and associated services. They often agreed that a vegetation management program can also improve the appearance of a property, and that these efforts are necessary to protect the home in the case of a wildfire. Homeowners further agreed that mitigating wildfire risk is a shared responsibility, and where mandatory requirements were in place, most homeowners understood the need.

Researchers concluded that this research result aligns with the larger body of research on community preparedness and the involvement of citizens in resource management. They felt that more data is needed on possibly effective voluntary compliance programs coupled with extensive public education.

### Getting started with local programs

In Vogt’s experience, communities becoming engaged in wildfire mitigation programs can start by assessing the risks and reducing them wherever possible. “This might include campfires, all terrain cycle sparks, arson (through law enforcement) and garbage burning. The next step is to zone and plan for ‘safe’ places for people to live.”

## Management Implications

- Mandatory programs for WUI hazard mitigation can be effective if the perceived risk of fire is high, and if the programs are accompanied by effective education and equitable compliance management.
- Defensible space ordinances can be effective tools for hazard mitigation. It is important that homeowners understand it is a mutual responsibility of all owners to reduce fire risk.
- Most homeowners will require training and consultations to understand the concept of defensible space for hazard mitigation. The need for repeated education and consultation opportunities cannot be over-emphasized.
- Homeowners prefer to receive written notification of changes and new developments in hazard mitigation programs.
- Community services such as assistance in vegetation waste removal are widely recognized as valuable.

Vogt feels the next step would be creation of building codes and educational materials. “These help homeowners build in the best places on their land, with the best defensible space practices in terms of vegetation and lawn, as well as appropriate building materials.” Finally, she says, it is necessary to have appropriate policies, enforcement, and incentives to achieve both acceptance of the program and compliance.

## Further Information: Publications and Web Resources

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## Scientist Profile

### Principal Investigator:

Dr. Christine Vogt, Ph.D. is an Associate Professor with Michigan State University in the College of Agriculture and Natural Resources. Dr. Vogt studies residents, recreationists and tourists who live near or spend time outdoors in settings where wildfire can impact lives, housing and local tourism economies. She and her two fellow researchers have collaborated over the past ten years on wildfire research in various areas in western, southern and Midwestern states.



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